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THE THREAT OF THE PREMIUM TANK
THE PRODUCT AND PROCESS OF THE SOVIET EXPERIENCE

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

James M. Warford, MAJ, USA
B.A., University of Santa Clara, Santa Clara, California, 1979

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MAJ James M. Warford, USA

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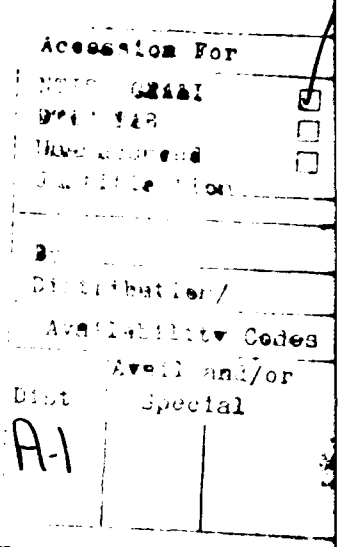

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Name of candidate: MAJ James M. Warford

Title of thesis: THE THREAT OF THE PREMIUM TANK
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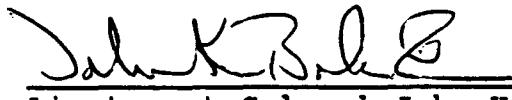
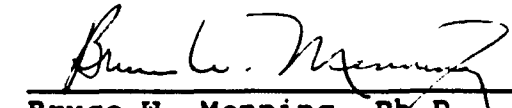
Approved by:

Lieutenant Colonel Robert E. Lee, M.A., Thesis Committee Chairman



Lieutenant Colonel John K. Boles III, M.A., Member



Bruce W. Menning, Ph.D., Member

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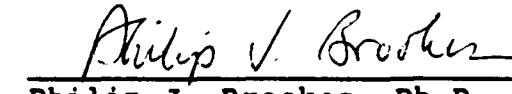

Philip J. Brookes, Ph.D., Director, Graduate Degree Programs

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ABSTRACT

THE THREAT OF THE PREMIUM TANK: THE PRODUCT AND PROCESS OF THE SOVIET EXPERIENCE by MAJ James M. Warford, USA, 123 pages.

This study investigates the tank development concept of simultaneously evolving two parallel tank designs, and fielding both tanks in a high-low force mix. The high end of this force would consist of very high value and innovative Premium Tanks which incorporate the highest technology available at a given time. Because of their inherent high cost, complexity, and high risk design, premium tanks are normally produced in relatively small numbers. The low end of this force mix would be made up of Main Battle Tanks that are less sophisticated and cheaper to produce than premium tanks, and would be produced in much larger numbers.

Focusing on the Soviet example of premium tank development, this study emphasizes the massive impact these tanks have had in the past as well as the projected threat new premium tanks constitute for the future.

This study concludes with an examination of a future premium tank design that represents a new and projected premium tank threat. The employment of the next premium tank may give a new adversary a critical advantage for the future.

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CHAPTER ONE

INTRODUCTION AND REVIEW OF LITERATURE

Research Question

Does a potential adversary's capability to develop, produce, field, or acquire innovative and high technology tanks constitute a threat to the U.S. Army of the 1990s and beyond?

> The fact was that the Soviets had, as one general later put it, "turned inside us." They had managed to field a tank that, despite its shortcomings, was ahead of anything in the West. American tankers were right in thinking that if war came, they would almost certainly lose-and lose quickly.1

With the signing of the Commonwealth accords on December 21, 1991 the Soviet Union, as the world has known it, ceased to exist. The new Commonwealth of Independent States (CIS) has replaced it. The CIS has inherited all of the former Soviet Union's military hardware. While the threat posed by the CIS is far below that of its

predecessor, the surviving legacy of one of the Soviet Army's most significant developments in land warfare remains. The demonstrated capability to develop, produce, and field innovative and high technology tanks, and then keep those tanks secret until they are needed. This remains a matter of grave concern. The product and process of the historic Soviet experience with the development of the premium tank, is an example for the U.S. Army and any potential opponents of what can be achieved by the development of a truly superior tank.

THE SOVIET EXPERIENCE

According to The Military Balance 1991-1992, in June 1991 the Soviets could field a tank force of approximately 54,400 tanks. Of this total, approximately 20,725 were located in the Atlantic To The Urals (ATTU) Zone specified by the CFE negotiations; and between 4,116 and 5,000 were still located in the Western Group of Forces (WGF) section of eastern Germany.[2] Unlike the total tank strength of a Western army, these Soviet totals embodied the results of a unique Soviet concept. The concept concerns the fielding of a tank force consisting of two different tank types in a high-low mix.

The Soviet Main Battle Tank (MBT) was designed as a low-cost tank that was intended to be fielded in lower

priority Soviet divisions as well as being made available to Soviet allied countries. These tanks had the necessary capabilities to be competitive on the battlefield, while being inexpensive and simple enough to be produced in very large numbers. Some of the most well known tanks in the world are Soviet MBTs: the T-54, T-55, T-62, and T-72. Although not incorporating the cutting-edge of tank technology, these tanks still have been very successful designs. The T-55 MBT, for example, was in production from 1958 to 1979 for a total Soviet production run of approximately 27,500 tanks.[3] T-55 MBTs are still widely used today, with approximately 1500 T-55s and its variants originally available to the Iraqi Army during Operation Desert Shield/Desert Storm in 1990/1991. MBTs, like those described above, constitute the bulk and the low-end of the Soviet tank fleet's high-low mix.

THE PREMIUM TANK

The Soviet tank type that made up the high-end remainder of the fleet was the Premium Tank (PT). The concept of the premium tank has historically been uniquely Soviet and therefore has no Western equivalent. A premium tank is defined as a very high value and innovative tank that incorporates the highest technology available at a given time. The premium tank concept should not be confused with the development and fielding of sophisticated MBTs like

the M1 Abrams and Leopard 2 in the West. In those armies the sophisticated MBTs are fielded alongside older tanks to allow the numbers of the new MBTs to get large enough for a one-for-one exchange with the new model. Then the older tanks are taken out of frontline service and supplied to the various reserve forces. According to the premium tank concept, both the less sophisticated MBTs and the premium tanks are developed and fielded concurrently, with the reserve forces employing the same MBT as the bulk of the active force.

Due to their inherent high cost, complexity, and high risk designs, premium tanks are normally produced in smaller numbers than main battle tanks. The relationship between these two tank types, however, is very close. In the Soviet example, the premium tank and MBT designers relied on each other for mutual support. In some cases, technological innovations that required a higher level of maintenance support, or were initially very expensive to produce would eventually appear on MBTs once they matured sufficiently. This "sharing of the wealth" not only ensured that the quality of the MBT force was improved as much as possible, it also ensured that a high degree of commonality existed between the two tank types. This explains some of the confusion that spread through the various Western intelligence agencies when two very similar Soviet tanks appeared in 1976 and 1977. Since the Soviet T-64 premium

tank and the Soviet T-72 MBT have many of the same characteristics, they were difficult to tell apart. Eventually, enough information was learned about the superior T-64 to separate it from its less sophisticated stablemate.

PREMIUM TANK EMPLOYMENT

In addition to the technological innovations incorporated into the premium tanks, the Soviets also were concerned with ways of employing them to fully exploit their capabilities. The best example of this is the T-64 and its role in the Soviet Operational Maneuver Group (OMG) and Forward Detachment. The Operational Maneuver Group, first identified in the Polish military press in 1981,[4] was not a standard organization with a fixed structure. An OMG was normally a highly capable combat force that was task organized for a specific mission. An Army level OMG, for example, would probably be made up of a division that had been reinforced with aviation units, engineer units, and additional logistic support elements. Designed to operate as a separate force, the OMG would be basically employed as a strike force that would exploit a breach created in the enemy defenses and drive for specific deep targets.

OMG missions could include the destruction of major NATO weapon systems that were capable of destroying Soviet

main body forces, disrupting coordinated NATO defenses to the point of seriously reducing their effectiveness, and the capture of objectives and key terrain in the enemy rear area that would facilitate the rapid movement of the main body.[5] For any of these missions to be possible, the OMG would initially be equipped with a tank that had the capability to penetrate NATO defenses and survive the intense volume of fire presented by NATO antitank weapons. The T-64 premium tank, with its vastly improved capabilities, gave the Soviets the "OMG Tank" they were looking for. The T-64 became the cutting-edge of this dangerous Soviet operational concept. Although the organization that became known as the OMG is dead, the Soviet concept of a well equipped deep strike force is still an important topic of discussion.

Like the OMG, the Forward Detachment was a deep strike or raiding force designed to disrupt the cohesion of NATO defenses. Division forward detachments, normally consisting of reinforced tank battalions, would attack ahead of the division main body to penetrate NATO covering forces. They would then move as quickly as possible in prebattle or march formation to capture key terrain in the main defensive area. The goal of seizing this key terrain was to disrupt or preempt the conduct of the defense, and to open multiple avenues for the attacking divisional first echelon forces.[6] Again, like the OMG, the requirement to

penetrate the NATO defensive lines dictated the use of a premium tank. Only a tank with the firepower, mobility characteristics, and armor protection of a premium tank had the capabilities essential to the use of the OMG or forward detachment. It was within these two offensive concepts that the technological advantage gained by the premium tank could be employed to the fullest extent.

SOVIET TANK DEVELOPMENT

In the Soviet experience, the development of armored vehicles has historically been a complex process headed by the Defense Ministry and carried out by several industrial ministries. While the Soviet General Staff examined the requirements for future armored vehicles, the Technical Institute for Armored Technology at the Kubinka Armored Proving Grounds worked on new and innovative technologies that would be incorporated into those future armored vehicles.[7] If one of the studied concepts is selected for further development, a commission would be formed to prepare a requirement that would be formalized into a Tactical Technical Assignment. At the completion of advanced development, a Technical Tactical Requirement was drawn up. Once the approval of the Defense Ministry and General Staff was received, it was handed down to the relevent Design Bureau.

The design bureau is more than a tank design team, and as such, has no direct American counterpart. Not only do they design new armored vehicles, they also may control the plant that produces the new weapon. According to U.S. sources, there were seven design bureaus associated with tank, armored vehicle, and artillery development in the Soviet Union.[8] Each of these seven design bureaus normally was responsible for one part of the overall armored vehicle development plan. Historically, there has been a separate design bureau for the design and development of medium tanks, heavy tanks, and light tanks. The relevant design bureau selected or developed the necessary sub-systems and prepared to build a number of prototypes of the new design. These prototypes were then tested and refined by the design bureau. After these local tests, the vehicle was subjected to a series of state trials where a decision concerning the production of the new tank was made.

Contrary to the U.S. practice of delaying series production of a new tank until after later operational trials, a new Soviet tank design may have been deemed mature enough to be put into initial production at a much earlier stage. Once a significant number of the initial production models of the tank was produced, they were then put through operational trials. These trials were normally conducted by a "bell weather" division and would include the development of the tactics, maintenance procedures, and crew training,

required to support the tank. The result of this system was that the initial production or base model of the new tank may differ in many respects from the more mature and improved mass production or standard model. Finally, at this point the new tank was accepted into operational service. Development of the tank would normally continue throughout its service life, with improvements and up-dates added to the original design whenever appropriate.

THE T-34

The Soviet premium tank entered this system as a product of the Koshkin design bureau based at the Kharkov tank plant in July 1939. Koshkin felt that his T-32 prototype design should be considered a universal tank that could fulfill the roles of the the infantry support tank, the cavalry tank, and the medium tank. The decision was made to up-armor the original T-32 design and put it into production as the T-34 medium tank. The original production order was for 200 T-34s to be built in 1940, with the first two completed in February of that year. The T-34 Model 1940, at figure 1, did suffer from some major teething problems with its transmission, a fact that probably caused more T-34s to be lost due to mechanical problems than enemy action in 1941.[9] The original short barreled 76.2mm main gun mounted on the T-34 Model 1940 also fell short of the stated requirements. New T-34 Model 1941s, mounting a much

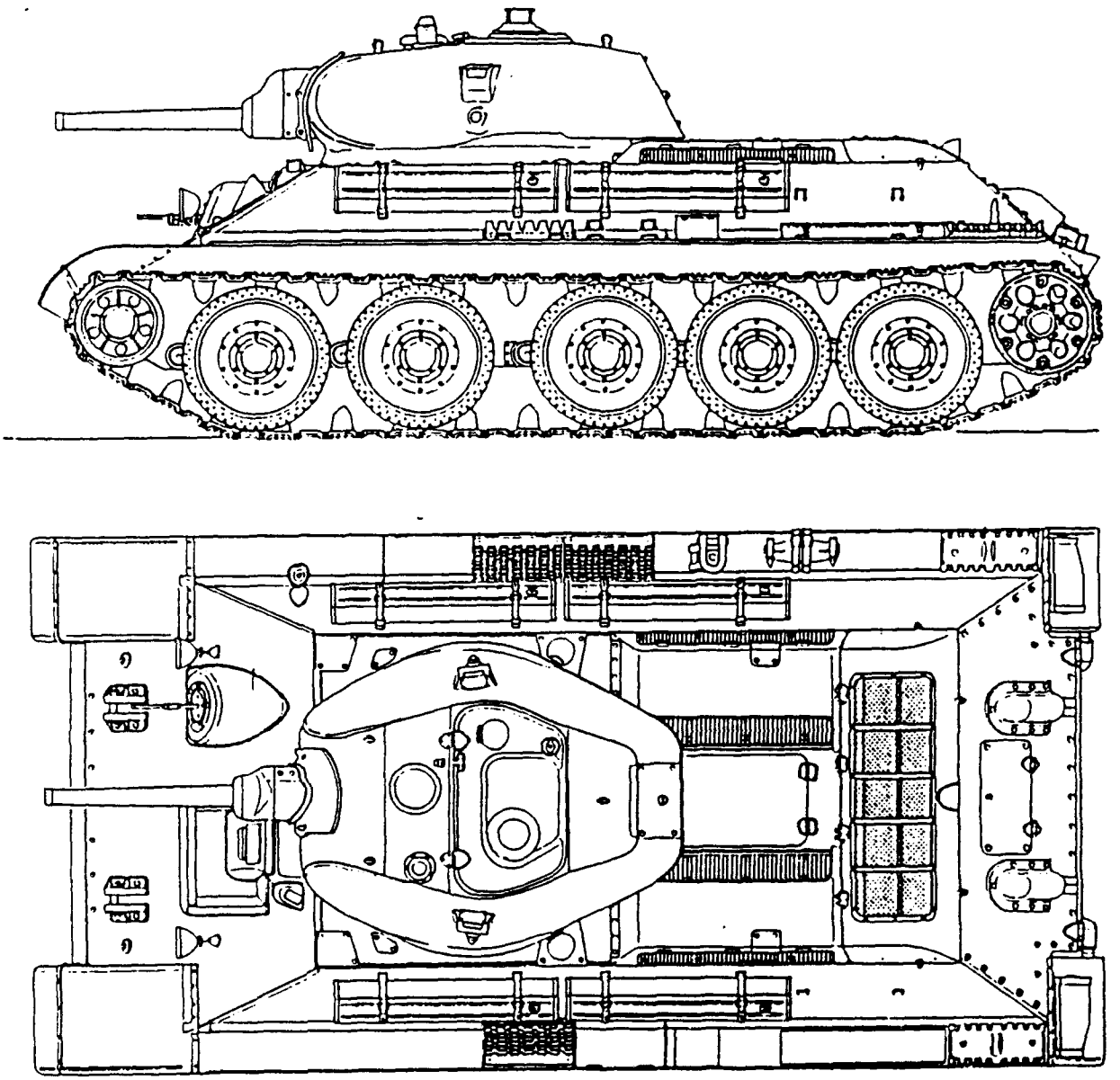

Figure 1-Soviet T-34 Model 1940
Source: TANK Magazine #8, 1991

improved longer barreled 76.2mm main gun went into production just prior to the start of the war. With the new main gun and improved transmission, the T-34 would prove to be superior to any tank on the battlefield.

THE FIRST PREMIUM TANK

The T-34 is classified as a premium tank for many reasons. First of all, it was truly a universal tank. The T-34 was designed to fulfill the roles of three different classes of tank. Although the eventual decline and fall of the only other really credible class of tank, the heavy tank, was still many years away, the T-34 was virtually self-supportable. In fact, the excellent and very well known KV-1 Model 1940 heavy tank was not as well armed as the T-34 due to it mounting a less potent 76.2mm main gun. It was later replaced by the same main gun carried by the T-34. The thicker armor fitted to the KV-1, over that mounted on the T-34, was also a mixed blessing due to the lack of increased engine power to compensate for the additional weight. While the KV-1 would prove to be a very capable stablemate to the T-34, it clearly did not display the innovations and advanced capabilities that would bring Soviet post-war heavy tanks and the modern premium tank on line.

Secondly, the T-34 employed a revolutionary combination of the three classic tank design areas: firepower, mobility, and protection. As mentioned above, the main gun mounted on the T-34 consisted of a very effective 76.2mm gun that was far superior to anything the German Army had at the time. The T-34's thick and well sloped frontal armor, conceived by Koshkin's team member M. Tarshinov, was very innovative and truly ahead of it's time. By angling the front slope or glacis armor of the T-34, an attacking projectile was forced to penetrate beyond the armor's actual thickness and into the length of the armor plate. The result was that the vast majority of the projectiles fired at the front of the T-34 would simply glance off the sloped armor. The mobility characteristics of the T-34 were also superior. The combination of a high powered engine, innovative wide tracks, and light weight "obviously imparted an extraordinary cross-country mobility to the tanks through mud, swamps, or snow, a fact which was subsequently fully proved and which greatly increased the combat value of the T-34s."[10] The revolutionary combination of innovative tank technology represented by the T-34 would prove to influence or dictate the designs of all the tanks that would follow it.

Finally, the massive reaction the T-34 caused within the German Army also confirms the T-34's label as a premium tank. Prior to the new Soviet tank's appearance on the battlefield, the Germans were given a hint of what was to come. In the spring of 1941 a Soviet military commission was sent to Germany to visit various German tank factories and schools. Since the Germans had not yet invaded the Soviet Union, Hitler decided that the visiting Soviets would be allowed to see all the latest tank production facilities as well as the best tanks in the German Army. He insisted that nothing be concealed from the Soviets. The Germans felt that their latest tanks would surely be technically superior to any in the Soviet Army, and that this superiority would override any Soviet numerical advantages.

When the Soviets were shown the German Panzer Mark IV, however, they were not impressed. They did not believe that the Germans were showing them their best tanks. The Soviets were convinced that the Germans were still concealing their latest tanks, and complained that they were not being allowed to see them. After the Soviets had left, the German Ordnance Office eventually came to an unfortunate conclusion. The fact that the Soviets insisted that they were not being shown the best the German Army had to offer,

when in fact they were, meant that the Soviet Army may have already possessed a technically superior tank.[11]

This eleventh-hour realization became battlefield fact a few months later when the T-34 made its appearance at the end of June 1941. This Soviet premium tank pressed the Germans into the very dangerous position of having to react to a technically superior enemy tank. According to General Heinz Guderian, the T-34 caused a crisis in German tank and antitank warfare. The impact of this new Soviet tank was so great, that Guderian urged that a commission made up of German tank designers and ordnance experts be sent to the front to examine these new Soviet tanks first-hand. One of the first recommendations was to rush a German copy of the T-34 into production and get it out to the troops as soon as possible. It was also clear that the German antitank gun arsenal would require the addition of a new heavy gun capable of knocking out the T-34. The biggest problem for the Germans was that the series of demanded responses to the T-34 would take a long time to materialize. The crisis mentioned above was far reaching and forced the Germans to expedite the development of projected weapons as well as the fielding of modifications to their currently fielded tanks.

FROM T-34 TO THE FUTURE PREMIUM

The relationship between the T-34 and modern Soviet premium tanks is not as confused as it may appear. While successful characteristics from earlier premium tanks have been incorporated into post-war MBTs, the premium tank line has remained relatively constant. The premium tank has evolved from the T-34, through the Soviet post-war heavy tanks, and into the current T-64 series and T-80 series of modern premiums. Like the premium tanks themselves, information concerning these tanks is relatively scarce and far more restricted than the data describing more well known tanks. When any questions are asked concerning the future of the premium tank however, the available open-source information is even more restricted and details are practically nonexistent.

THE PREMIUM TANK-5

Due to the lack of available information, the future of the premium tank will be examined using the author's projected "Premium Tank-5" (PT-5) as the subject. The projected Premium Tank-5 (after the T-34, post-war Soviet heavy tanks, T-64 series, and T-80 series of premiums) is the result of combining the available open-source information with the analysis of the author. The discussions that have taken place concerning premium tanks

of the future have focused primarily on three developments originally known as the Future Soviet Tank-1 (FST-1), FST-2, and FST-3. These initial designations do not refer to actual vehicles; instead, they refer to different levels or classes of tank technology that are expected to appear. These expectations and the threat represented by the PT-5 are the focus of this thesis. Just as the T-34 achieved the advantage over the German tanks of World War Two, the unexpected appearance of the Premium Tank-5 could force the U.S. Army of the 1990s and beyond into that same dangerous position.

The importance of this study is clear: a modern-day crisis in tank and antitank warfare caused by the historically demonstrated capability to develop, produce, and field innovative and high technology tanks must be prevented. The Premium Tank-5, and the threat it represents, must be fully understood and effectively countered to prevent any potential opponent from gaining a decisive advantage on the battlefields of the future.

REVIEW OF LITERATURE

There is currently a vast amount of general information available on the development and characteristics of the tanks that have appeared since the start of World War Two. As this study is being written, however, the only

known development and deployment of premium tanks has been confined to Soviet efforts since the appearance of the T-34. Therefore, a large part of the relevant literature examined for this study is focused on the design and development of Soviet tanks. Articles from publications like Jane's Intelligence Review and International Defense Review, as well as U.S. Government publications like the Soviet Military Power series have been critical to this study. Some of the more important books on the subject include: Soviet Tanks and Combat Vehicles 1946 to the Present, by Steven J. Zaloga and James W. Loop, Abrams: A History of the American Main Battle Tank, by R.P. Hunnicutt, King of the Killing Zone, by Orr Kelly, and Inside the Soviet Army, by Viktor Suvorov. The Jane's series of yearbooks including Jane's Armour and Artillery 1990-1991, by Christopher F. Foss as well as translations of German assessments from World War Two also proved to be invaluable to this study. Finally, some of the most valuable sources of information concerning the development of Soviet tanks are the Soviets themselves. Official Soviet publications like Red Star, Technology and Armament, and Soviet Soldier can provide keen insights into the direction of premium tank development over the years.

STATUS OF THE EXISTING RESEARCH

The term "Premium Tank" was first used by Soviet armor expert and author Steven J. Zaloga in 1987. In his book Soviet Tanks and Combat Vehicles 1946 to the Present (co-authored with James W. Loop), Zaloga reported that the Soviets put a radically new tank into production in 1965 that would prove to be the most controversial tank since World War Two. Because the T-64 was so superior to the U.S. and NATO tanks of the same period, its appearance forced the armies of the West to scramble to Soviet innovations. The revolutionary combination of firepower, mobility, and protection embodied in the T-64 would have a significant impact on all the tanks that followed it. Zaloga also details the Soviet system of developing and deploying tanks in a high-low mix. What may have appeared to be a modern characteristic of the Soviet tank development process, was in fact initiated in the late 1940s.

In this book, as well as several other books and articles he has authored, Zaloga tells the story of Soviet tank development since the end of World War Two. While this description was very informative and introduced the concept of the premium tank, it failed to fully detail the continuing relationship between the premium tank and the MBT. Zaloga, like some other writers, has incorrectly identified this relationship as "a curious pattern of an

advanced-technology tank followed by a de-evolutionary, retrograde design."[12] This explanation truly underestimates the significant role played by the MBT, and completely misses the essential sharing of mature premium tank technology from the premium to the MBT design. This gap in the currently available research would make the examination of a future non-Soviet premium tank very difficult. This difficulty should be overcome by the research conducted for this study.

In his books, Soviet Tanks and Combat Vehicles of World War Two (coauthored with James Grandsen), and Soviet Tanks and Combat Vehicles 1946 to the Present, Zaloga gives the authoritative analysis of the development of Soviet heavy tanks. The history of Soviet heavy tanks is significant to this study because it is an integral part of the development of the premium tank. Starting with the IS-3, which saw only limited combat around Berlin during the final weeks of the war, post-war Soviet heavy tanks were in effect premium tanks themselves. The revolutionary design and excellent capabilities of these tanks are also highlighted in John Milsom's book Russian Tanks 1900-1970. Like the earlier T-34 medium tank, the appearance of the IS-3 heavy tank in 1945 proved to have a significant impact on the tank designs being developed in the West. The significant role played by the post-war heavy tanks in the lineage of the premium tank was brought home by the

appearance of the T-64 in 1976. Apparently, it took a tank with the capabilities of the T-64 to convince the Soviet Army that the heavy tanks were no longer required.

In his book Inside the Soviet Army, Viktor Suvorov gives several examples of the Soviet ability to keep certain Soviet weapons truly secret. According to Suvorov, the Germans were not the only ones surprised at the appearance of the T-34 in World War Two. The Soviet ability to keep secrets applied to their own generals as well. Once the war had started, the secret tanks were moved forward and sent into battle. While the Soviet tank crews had been trained on older, less sophisticated tanks, they quickly mastered the T-34s. Suvorov states that this trend would continue; "they learn on a Volkswagen, but keep the Mercedes secretly hidden away until it is really needed."[13] One of the best examples of the ability to keep key weapons secret concerns Soviet tank destroyers or heavy assault guns. According to Suvorov, these tank destroyers were only employed during periods of tension, and were not fielded outside the Soviet Union. Since Inside the Soviet Army was published, the Soviets have admitted that these tank destroyers do in fact exist.

The existing research does confirm that the Soviets historically have been able to surprise their enemies with previously secret weapons. The available literature goes

even further by reporting that this was not confined to obscure weapons that were produced in small numbers. According to King of the Killing Zone by Orr Kelly, the appearance of the T-64 on a battlefield of the 1960s or 1970s "would have come as almost a total surprise, truly a secret weapon."[14] While this premium tank was being fielded in the Soviet Army, the armored forces of the U.S. Army were equipped with tanks that fell far short of their potential competition.

In his book Abrams: A History of the American Main Battle Tank, R.P. Hunnicutt describes the development of the tank projects that were intended to replace the brand new M48 Patton and still to be developed M60 series of MBTs. The first of the three major tank development programs initiated was the T95 program. Although not fitting the definition of a premium tank completely, the American T95 offers the only known non-Soviet look at a premium design. The T95 premium tank project incorporated many advanced and innovative concepts, and like the very similar Soviet T-64, was truly ahead of its time. The T95 was fitted with a large caliber smoothbore main gun, advanced fire control system, innovative engine, and innovative siliceous-cored composite armor. The T95 premium tank project ran from January 1955 to July 1960, when it was cancelled in favor of an improved M48A2 MBT known as the XM60. Not willing to accept the risks inherent in an innovative design, the U.S.

Army felt that it was not necessary to fully develop and field a premium tank.

A recurring problem in the available literature is the apparent desire by many authors to attack the quality of the Soviet Army in general, and to criticize Soviet tanks in particular. Some of these authors are quick to compare Soviet premium tanks to more modern Western tanks like the M1A1 and Leopard 2. This comparison, however, is one between apples and oranges. Since Operation Desert Storm, these unfair comparisons have become all the more popular. In many cases the poor performance of the Iraqi Army was incorrectly blamed on the quality of the hardware provided by the Soviets. The Soviets themselves would probably agree that tank for tank, the M1A1 is far superior to the exported T-72 MBTs employed by the Iraqi Army. What many commentators are failing to recognize is that for any of these comparisons to be valid, they must set two tanks with similar capabilities against one another. Given tank crews of equal training, capabilities, and motivation, an accurate appraisal of the M1A1 should include a comparison against the next premium tank it could encounter; not the 26 year old T-64. The research conducted for this study and the resulting Premium Tank-5 examined in Chapter Five, is intended to balance the scales and allow a true comparison between American capabilities and the projected threat.

END NOTES

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CHAPTER TWO

RESEARCH METHODOLOGY

The examination of the premium tank concept can be a challenge to the researcher. The study of a weapon system that has been shrouded in secrecy throughout its lifetime, is very similar in many respects to more well known and understood vehicles, and is intended to outperform both fielded and comparable projected tanks by using the cutting-edge of available technology, is likely to get mired in misperceptions and detail. To contend with this problem, the research methodology for this thesis is based on the original Premium Tank Analysis Model (PTAM) at figure 2. The intent of the PTAM is twofold: first, to guide the research conducted for this study while examining the common characteristics that make up both the MBT and the premium tank; and second, to focus on the intent and capabilities that separate these two tank types.

As can be seen in figure 2, the PTAM portrays the Premium Tank (PT) and the Main Battle Tank (MBT) as being parallel and simultaneous development efforts. Historically, the Soviets would employ a specific design bureau to develop a premium tank, while other bureaus would concentrate their efforts on MBTs or heavy tanks. As stated in Chapter One, information would flow between the bureaus to ensure the compatibility and commonality of the parallel designs. Both the PT and the MBT incorporated six design areas: firepower, mobility, protection, production, deployment, and impact. While the first three of these areas are considered traditional concepts, the second group is original to this study. Prior to conducting an examination of each one of these areas, it should be emphasized that, although these tank types were being developed concurrently, the influence that each design area had on a given tank design could be very different. The way to separate the PT from the MBT, therefore, is to quantify each design area and then determine how it relates to a given tank.

FIREPOWER, MOBILITY, AND PROTECTION

The three classic interrelated tank design areas, firepower, mobility, and protection, were selected for the model because they have been at the heart of tank design since the weapon's conception. Prior to the tank's first

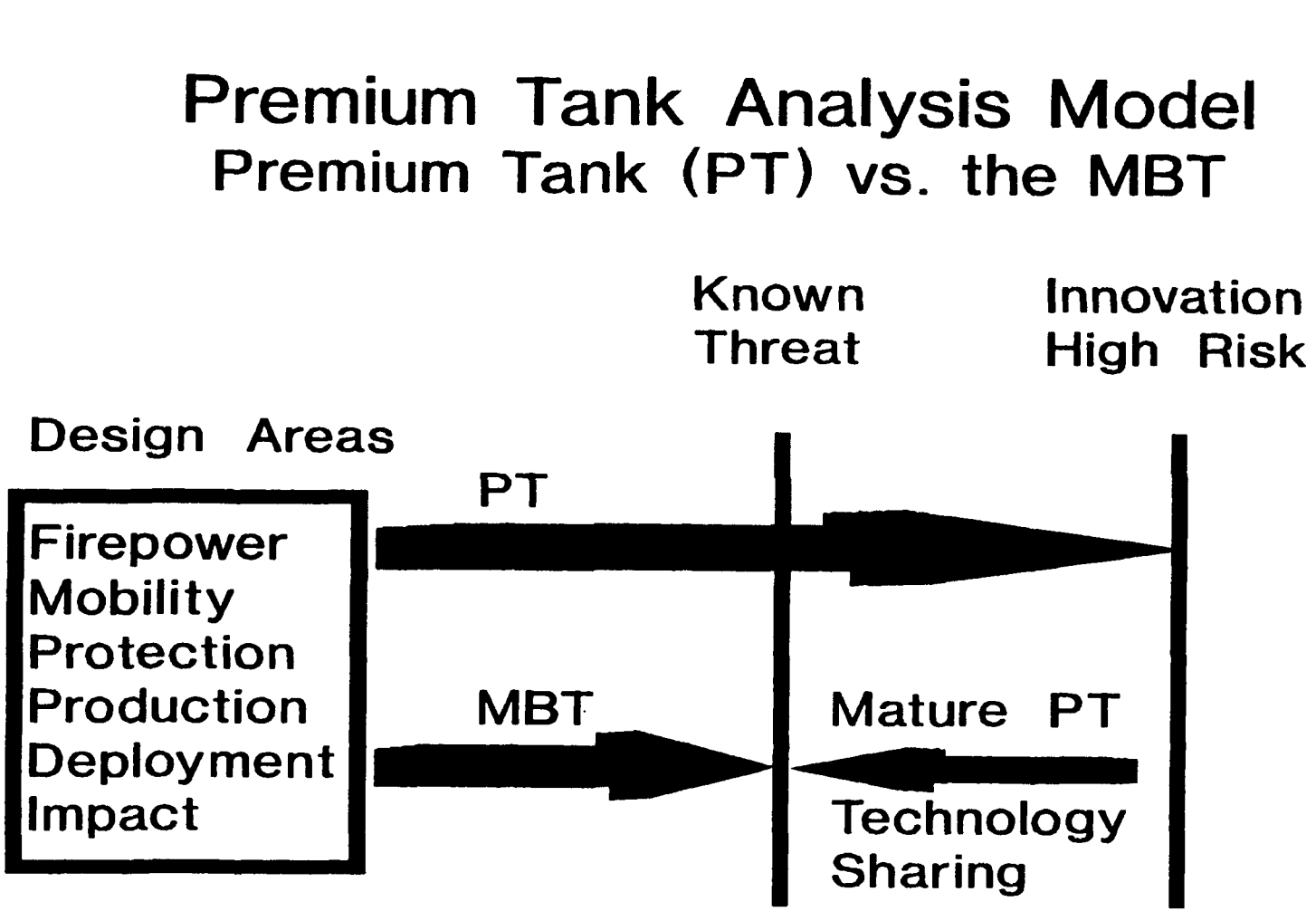

Figure 2-The PTAM

appearance on the battlefield on September 15, 1916, the requirement for a "mobile protected gun" was well known. As soon as the threat of enemy tanks became a reality, the ability of one tank to destroy another evolved into a primary requirement of tank design. This requirement was met through the use of firepower. Over the years, the ability to destroy enemy tanks has become a "yardstick" for measuring the effectiveness of one's own tanks. "In consequence, the evaluation of tank designs reduces to the determination of the probabilities of success in destroying hostile tanks."[1]

Like firepower, the mobility of the mobile protected gun has been a critical factor in the history of tank design. After the start of World War One, the adoption of trench warfare highlighted the need for tracked armored vehicles. Although very slow and cumbersome, even by World War Two standards, the tanks that emerged to fight in World War One could cross wide trenches, crush thick strands of barbed wire, and knock out enemy positions. The ability to successfully traverse a cratered battlefield not only enabled the tank to bring its firepower to bear on the enemy, it also provided an important degree of survivability to the tank itself. The more mobile the tank, the more difficult it became for the enemy to hit. Based upon the power provided by a given engine and the design's total

allowable weight, the mobility available to a tank quickly evolved into a paramount consideration of tank design.

When the tank first appeared, it was able to maneuver on the battlefield with relative immunity. The protection provided by its armor plating made it proof from the devastating fire of the machinegun. The thin armor originally carried by the tanks of World War One, however, was quickly over matched by the development of antitank weapons. The armor fitted to the tanks, in turn, was then increased to protect them from these new threats. The resulting action-reaction development policy between firepower and armor protection still governs tank development. Since additional armor and larger cannons increase the weight of a tank, the mobility available will be reduced. As mobility is reduced the tank will become more vulnerable to enemy fire, and will require heavier armor and more firepower to protect it. Like firepower and mobility, the concept of protection is a fundamental consideration in tank design. While each design area is critical to tank design individually, the modification of any one area has a profound effect on the other two.

PRODUCTION, EMPLOYMENT, AND IMPACT

As mentioned above, the second group of tank design areas is original to this study. Like the three traditional areas, the areas of production, deployment, and impact play an important part in the development of both the premium tank and the MBT. How each area relates to the two types of tank, however, can be very different. By definition, premium tanks are complex vehicles which are normally produced in relatively small numbers. Since fewer premium tanks are built, it is possible to concentrate their development and production at a few or even a single facility. Concentration not only allows the majority of the tank production effort to be focused on less sophisticated and easier to produce MBTs, it also helps maintain the inherent high level of secrecy associated with premium tank production. The production of MBTs, on the other hand, would be accomplished at a much higher rate. Since they are less costly, less sophisticated, and less controlled than the premiums, MBTs would be produced in enough numbers to equip the majority of home units as well as export customers.

How each type of tank was deployed would also be very different. The premium tank would only be provided to the highest priority units of the home forces. Using the Soviet Army as an example, the premiums were deployed only

to the Groups of Soviet Forces in Eastern Europe and to high priority divisions within the Soviet Union. In most cases, the existence of a certain premium tank would be kept secret until they are provided to forward deployed forces. The deployment of an MBT is not nearly as controlled as it is with a premium tank. From its inception, the MBT was intended to be widely deployed. In addition to being provided to the bulk of the home forces, the MBT could also be the tank used by the army reserve forces. A key consideration with the deployment of MBTs is their use by export customers. Since premium tanks are normally not exported, the deployment of the MBT by an allied country may provide the only look at a given country's tank development process. The Iraqi experience with the employment of Soviet MBTs during Operation Desert Storm will be discussed in detail in Chapter Four of this study.

Finally, the impact a given tank has on a country's enemies or potential opponents is a very key design area. While the two areas described above are very important and are critical to the discovery and identification of a premium tank, the impact that the design has on its adversaries is what truly separates the premium from any other tank. Chapter Three of this study will focus on the Soviet tank which can accurately be referred to as the "flagship" of the premium tanks: the Soviet T-64. The T-64 had a profound impact on the NATO armies of the Cold War

because its capabilities and resulting impact could have been a disaster for NATO had war broken out in Central Europe. More modern Soviet premium tanks like the T-80U and its potential successor were able to maintain the initiative by reinforcing this massive impact dealt to the Western Armies of the 1960s and 1970s. The impact of the MBT, on the other hand, is based on its original design combined with the mature premium tank technology that is borrowed from the more sophisticated design. This "technology sharing" enables the MBT to have a certain level of impact on any opponent. Since the MBT is normally more well known than the premium tank, the impact and reactions of the enemy may be based on the assessment of the far less dangerous of the two tank designs.

USE OF THE PTAM

As stated above, the development of the premium tank and the MBT are parallel and simultaneous efforts. While the objective for both designs on the battlefield is the same, the goal that each is designed to achieve is very different. As shown in the PTAM at figure 5, the premium tank is designed to have capabilities above and beyond those of the known threat, and if possible, any projected threats as well. This is made possible by the incorporation of innovative and high risk technology depicted in the PTAM as the line at the tip of the premium tank's capability arrow.

The use of cutting-edge technology in each of the related tank design areas is what truly separates these two tank types. The success of this process can be seen with the development of the T-64. This particular tank was provided with certain capabilities that were more advanced than NATO tanks that would not appear for an additional 15 or 16 years.

As seen in the PTAM, the goal of the MBT design is much less ambitious than that of the premium tank. Depicted as the line at the tip of the MBT's capability arrow, the goal for the MBT is the known threat. While the MBT is intended to fight and defeat identified and fielded threat tank forces, it is also intended to challenge the continued development of enemy MBTs. This challenge, seen in the continued development and improvement of one's own MBTs, is possible through the policy of incorporating mature premium tank technology into the development of MBTs. The advanced capabilities that initially were not available to the MBT designs are provided later as they mature. This sharing of the wealth ensures that the MBT stays competitive with continually evolving enemy MBTs. As shown in the PTAM, the mature premium tank technology arrow is directed back from the innovation and high risk goal of the premium tank to the goal of the MBT. In effect, the known threat is confronted from both the high and low end of this two tank, high-low development concept.

The PTAM is not a perfect model and clearly does not cover each premium tank perfectly. Projected future premiums like the Premium Tank-5 may also not fit the model exactly. In fact, using this model with the expectation that it will fit every situation perfectly is risky and will demonstrate the PTAM's limitations. The simplicity of its design and the ease with which it can be applied to both types of tank, however, highlight the utility and strengths of this model.

THE EXAMPLE OF THE T-64 AND T-72

Perhaps the best example for demonstrating the use of the PTAM is discussing the relationship between the Soviet T-64 premium tank and T-72 MBT. The T-72 MBT represents a classic main battle tank. It has very capable firepower, mobility, and protection characteristics, and is currently in the process of replacing the T-54/T-55 as the most widely deployed MBT in the world. When used as part of a complete system, which will be discussed in Chapter Four, it is a very powerful weapon. As can be seen in the PTAM, the advanced capabilities of the premium tank (in this case the T-64) were incorporated into the T-72 as they matured. Like the T-64, the original T-72 has grown into a series of 16 identified variants. Since the T-72 is less complex and cheaper to produce than the premium tank, the T-72 series

has been produced in very large numbers and has been widely exported.

Although the T-64 has shared some of its capabilities with the T-72, when the T-64 first appeared these capabilities were truly revolutionary. The Soviets accepted much risk with the T-64's expensive and complex design, so by Soviet standards the number produced was small and limited to an estimated 9,700 tanks. Some sources, however, put the T-64 production total as high as 13,500 tanks.[2] As will be discussed in detail in Chapter Three, the impact the T-64 had on the military world was significant. This impact was brought home to the armies of the West when the T-64 was deployed to the high priority units in the WGF in (what was) East Germany and to the Soviet Southern Group of Forces (SGF) formally stationed in Hungary.

The PTAM was developed to give the researcher the ability to analyze and compare the differences between premium tanks and MBTs. It provides a model where virtually any tank can be identified and evaluated. The research methodology developed for this study fully supports the body of the research conducted and was fundamental to the development of the answer to the research question.

END NOTES

CHAPTER TWO

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CHAPTER THREE

PREMIUM TANK CASE STUDY: THE SOVIET T-64

As stated in Chapter One, the appearance of the Soviet T-34 in 1941 came as a surprise to the German Army. This case, however, may have been only the first example of the Soviets' ability to beat their adversaries in tank technology. This capability-to develop technically superior armored vehicles and then keep these vehicles secret until they appear on the battlefield, or until their secrecy is no longer required-has been an increasingly dangerous threat. This capability has in fact been demonstrated twice in recent history.

The Soviets started to produce a new controversial and innovative tank in 1965. The T-64 premium tank was not only superior to the western tanks of the same period, but also forced the Western armies into the position of having to scramble to react to Soviet innovations. Even in peacetime, the T-64's appearance caused a massive reaction by the armies of the West. This reaction, however, was

only a fraction of the impact this tank would have wrought on the battlefield had war broken out. The U.S. Army must be prepared to identify and counter whatever develops as the next member in the line started with the T-34 and continued with the T-64. The U.S. must avoid any future "eleventh-hour" battlefield scenario that could translate into the same kind of surprise that the Soviets have been able to inflict upon their opponents in the past. A close examination of the T-64 suggests what could have happened if war had broken out prior to the appearance of the American M1 Abrams and German Leopard 2, as well as what might happen if the next innovative premium tank is allowed to surprise the U.S. Army.

ORIGINS OF THE T-64

When the Soviet T-62 MBT entered production in 1960, work had already started on a newer tank. By the time the T-62 was first seen in public in 1965, this still-newer tank had been put into production. While Western intelligence sources knew of the existence of this new tank, since it was not seen until 1976, they did not appreciate how radically it differed from earlier Soviet designs. Before identification of the new design that would become the T-64, the Soviets had developed tanks in a series of progressive, evolutionary steps. Starting with the T-34 series, and

running through the T-54, T-55, and T-62 MBTs, the Soviets had followed a fairly predictable path. The T-64, however, was a much more daring evolutionary step.

Like the T-34, the T-64 incorporated major changes from its predecessors. With its vastly improved armor, larger main gun, and new flat, opposed piston five-cylinder diesel engine, the T-64 was clearly in a class by itself. The production models of the T-64 developed by the N. Shomin design bureau were preceded by a number of prototypes that differed primarily in turret front and hull designs. Several sources identified a particular vehicle that was used for tests and became known as the T-67. This vehicle, probably originally identified in some very poor quality films of a winter exercise conducted in 1970, was most probably the base model T-64. This new tank was given the provisional designation of M1970, and has since been referred to as both the "T-70" and the "Dvina Tank" (after the March 1970 Dvina exercise in the Byelorussian Military District). Since the first views of the T-64 were of very poor quality (the tanks were most likely misidentified as developments of the T-62), various speculative designations were attached to this new tank. Once better quality photographs became available, it was obvious that the tank in question was much more than a modified T-62.

EVOLUTION OF THE T-64

The Soviet Army fielded the T-64 for operational trials in 1967 with the 100th Guards Tank Training Regiment.[1] Shortly after the start of these trials, the tank was subsequently issued to the 41st Guards Tank Division. Since its initial fielding, the Soviets have continued to develop and modify the T-64. To date, Western intelligence sources have identified seven different variants in the T-64 series. After the various prototypes mentioned above (jointly included as the first variant), the second variant discovered was the T-64 Base Model; which has also been referred to as the T-67, M1970, "T-70," and the "Dvina Tank." There had been some speculation concerning the main gun mounted on this tank. What was originally thought to be the same U-5T 115mm main gun from the T-62, is now belived to be a shorter version of the standard 125mm main gun. According to International Defense Review, the T-64 Base Model is recognizable by the infantry handrails mounted on the left and right side of the turret, and by the tool stowage box mounted on the right front fender. On later models of the T-64, this stowage box has been replaced by a standard fender-mounted fuel tank.

The many reported teething problems that have been associated with the T-64 over the years are probably a result of the problems encountered with the Base Model of

the tank. These problems primarily concerned the tank's automotive performance, although reports have appeared about problems with the ground-breaking and innovative automatic loading system as well. According to some of these reports, the tank's automatic loader occasionally "ate Soviet tankers" and that "few gunners are excited by the prospect of having their arm fed into the breach of the cannon."[2] More recent information indicates that these early reports were exaggerated and that the majority of these problems had been solved with the appearance of later variants.

The third variant of the T-64 is the T-64A, at figure 3, which is the standard model of the tank and has been produced in large numbers. The infantry handrails have now been eliminated, and the standard fender-mounted fuel tank is fitted. Initially, this model of the T-64 was fitted with four spring-loaded armor plates on each side of the hull. When deployed, these plates would stick out from the hull at a 45 degree angle and were intended to provide some protection against enemy High Explosive Antitank (HEAT) warheads. These plates gave the tank a unique appearance and were labeled as "gill armor." The T-64A went through several modification programs that included the replacement of the gill armor with full length non-metalic hull skirts, and the mounting of various patterns of smoke grenade launchers on the turret. The most significant modification done was certainly the replacement of the original optical

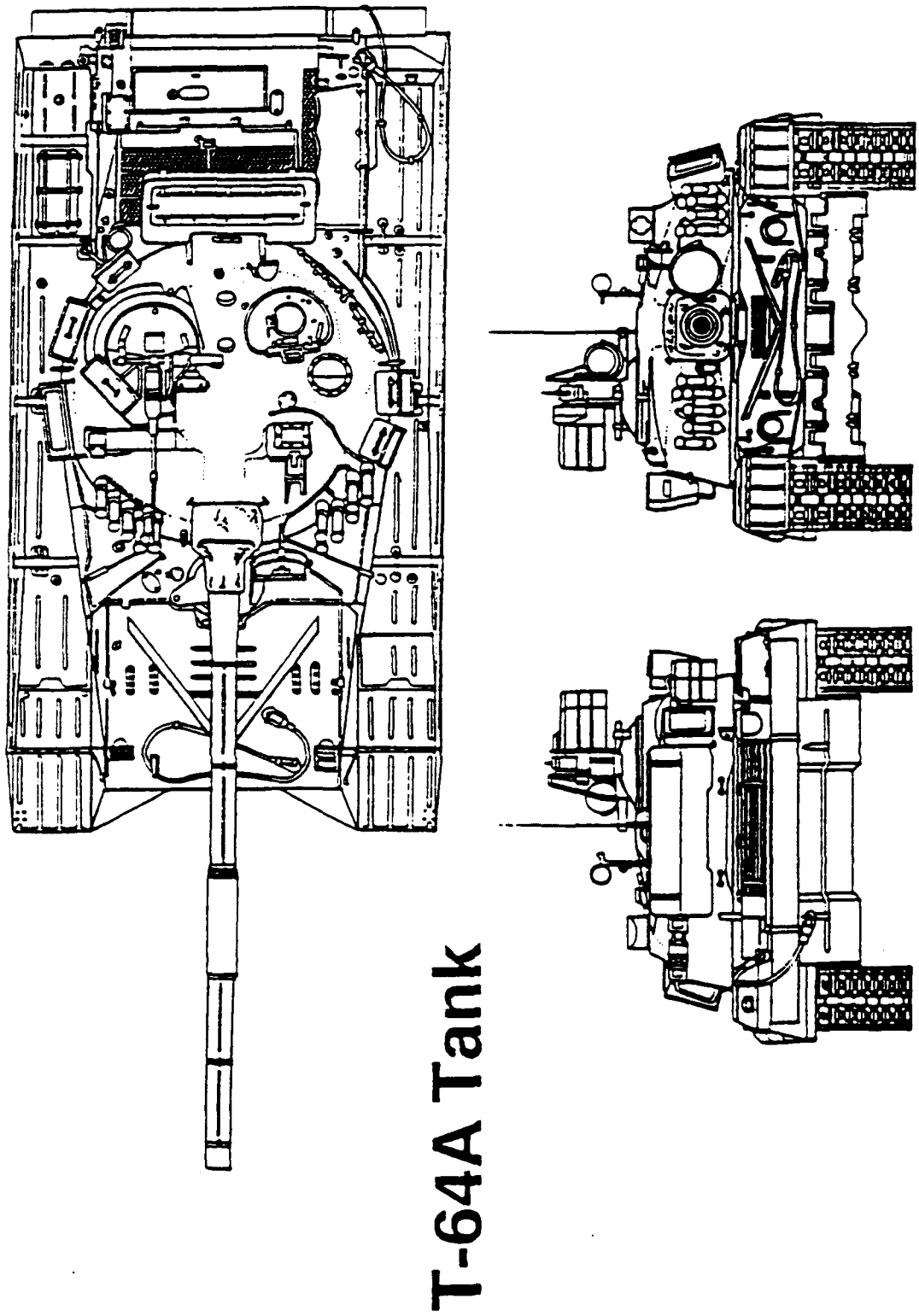


Figure 3-T-64A Tank
Source: Armor/Antiarmor Briefing, TTC 1989

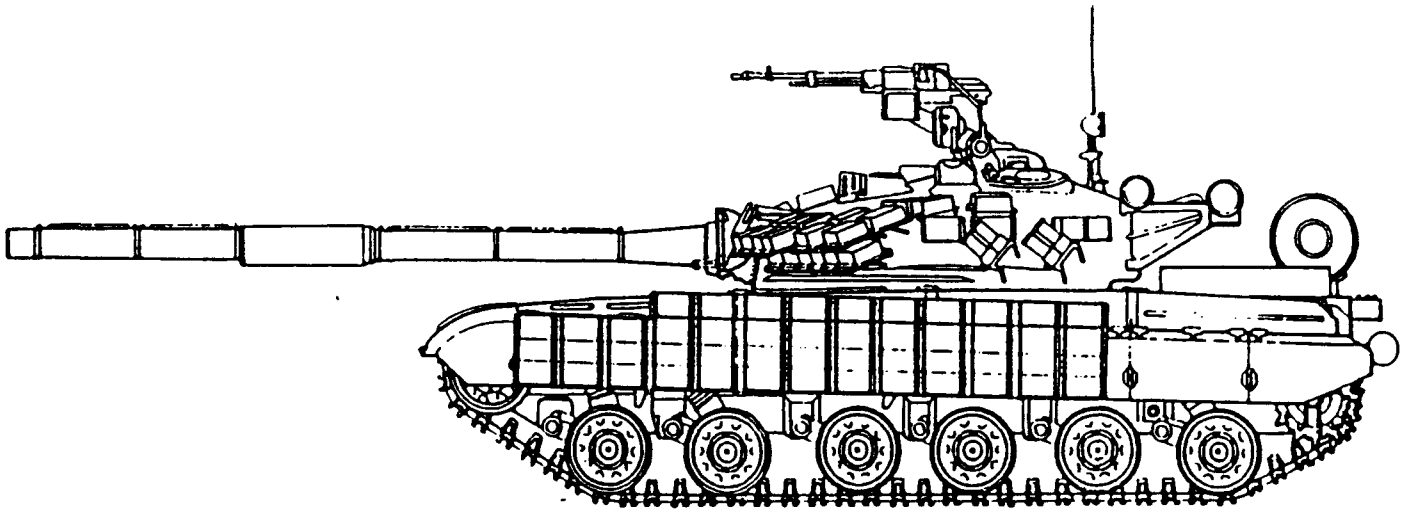
coincidence rangefinder with a laser rangefinder (LRF). This modification can be identified by the wider gunner's primary sight (GPS) protective box or "doghouse" with a much larger frontal glass area. This modification included the retention of the optical rangefinder "ear" that was required by the coincidence rangefinder on the right side of the turret roof. After the addition of the laser rangefinder, however, the right side optic was covered and sealed. With the new rangefinder the modified T-64A was given the designation T-64A LRF thus becoming the fourth variant of the T-64 series.

The fifth variant of the T-64 series is known as the T-64B1. This tank was paraded in Red Square in Moscow on 7 May 1985. Prior to the appearance of the Soviet T-80U premium tank on 9 May 1990, the T-64B1 was the only post World War Two premium tank to ever take part in that well documented annual parade. Sources have identified the T-64B1 as a version of the T-64B (detailed below) that is "not fitted with the guidance equipment for the KOBRA (AT-8) guided missile system."[3] The equipment in question consists of a small box housing the AT-8 Antitank Guided Missile (ATGM) guidance hardware which would be mounted on the right side of the turret roof in front of the tank commander's position. In place of this box, an "L-shaped" rail is fitted that may permit the mounting of the missile equipment if required. The T-64B1 is fitted with an LRF

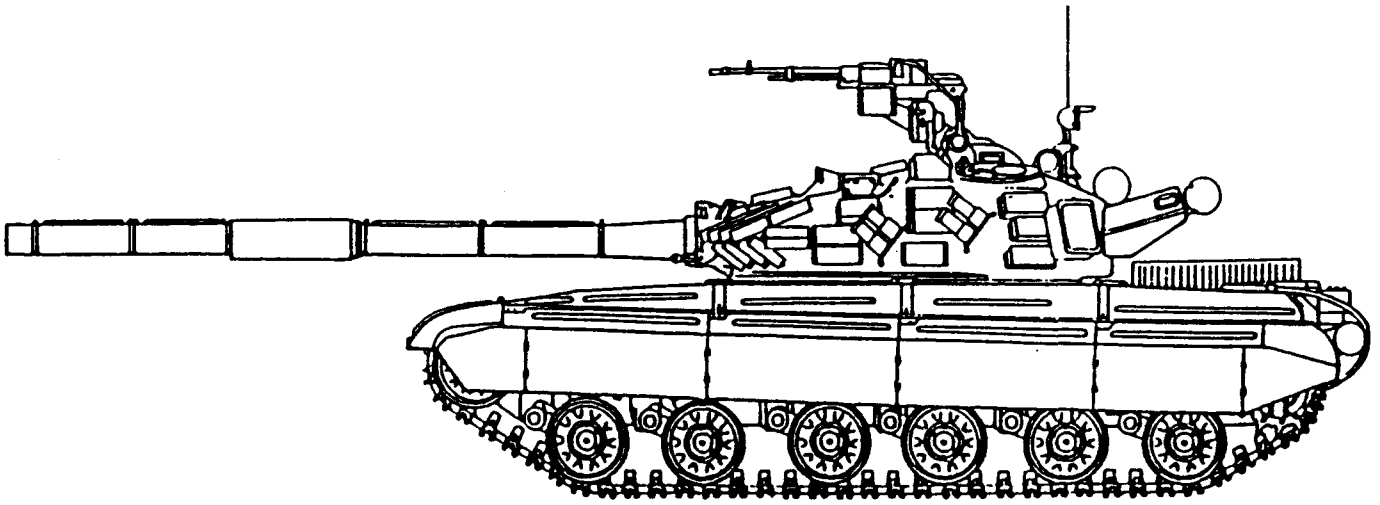
although the optical rangefinder "ear" has been eliminated completely. The T-64B1 was also the first T-64 variant photographed to be modified for the application of reactive armor. When elements of the 141st Tank Regiment, 13th Guards Tank Division, were photographed leaving Hungary as part of the reduction of Soviet forces in the Southern Group of Forces (SGF), T-64B1s were seen with the reactive armor fitted to the tanks. The significance of this modification, and of reactive armor in general, will be detailed below.

MISSILE-FIRING T-64

The T-64B, at figure 4, is the next variant in the series and has also been produced in large numbers. The T-64B, as mentioned above, also has the capability to fire the radio-frequency (RF) guided AT-8 NATO codename "Songster" ATGM. The Soviets apparently refer to this missile as the KOBRA. The AT-8 is a two-piece missile that is carried in the tank just like the conventional 125mm ammunition. When the missile is loaded by the automatic loader, the two sections are joined in the cannon's breach and then fired. Since the appearance of the T-64B, the specific details concerning the AT-8 have been a well kept secret. The unification of Germany and the demise of the former East German Nationale Volksarmee (NVA), however, has proven to be an unprecedented source of information



Initial configuration (1985)



Current configuration (1988)

Figure 4-T-64B with Reactive Armor
Source: Armor/Antiarmor Briefing, TTC 1989

concerning Soviet weapons to include tank main gun-launched ATGMs.

The former NVA operated a number of tanks known as the T-55AM2B MBT that is a heavily modified version of the well known original Soviet T-55 MBT. According to International Defense Review, these greatly improved tanks are capable of firing the 100mm laser guided 9M117 ATGM. Although a more modern missile than the T-64B's AT-8, the 9M117 can provide some details concerning this type of weapon. Upon firing, the 9M117 is launched from the barrel by an ejection charge and the missile's control fins are unfolded. The sustainer motor then burns for approximately six seconds and drives the missile to its target. In flight, the missile follows a modulated laser beam that the firing tank directs and zooms on to the target. The tank's gunner is only required to keep his sight on the target until the missile impacts. The maximum range of the missile is 4,000 meters, with a maximum flight time of approximately 12 seconds.[4] While the capabilities of this missile and the T-55AM2B that fires it may be debatable to some observers, it is apparently not to the German Army. Unlike the bulk of the former NVA T-55s inherited by the Bundeswehr, which have already been scrapped, the missile-firing T-55AM2Bs have been put into storage at least for the time being.

The missile-firing T-64B has been criticized for employing a sophisticated weapon system whose HEAT warhead is too small to successfully penetrate the advanced frontal armor of modern NATO MBTs. What these critics are failing to see is the primary mission of the missile-armed tank. Using its very powerful conventional kinetic energy armor piercing ammunition against those same NATO MBTs, the crew of the Soviet missile-armed tank would reserve it's missiles to engage and destroy NATO ATGM delivery systems. While there is a secondary capability to engage tanks like the M1 Abrams and the Leopard 2 from the flank or rear, the missile's primary targets are the M2 Infantry Fighting Vehicle (IFV), the M901 Improved TOW Vehicle (ITV), and the AH-64 Apache and AH-1 Cobra Attack Helicopters. The elimination of these ATGM systems from a distance beyond the maximum effective range of deployed NATO MBTs, is a capability the Soviets have been searching for since the first development of the ATGM. With the exception of the missile capability, the T-64B is very similar to the M1981/1; and with both tanks fitted with reactive armor they are very hard to tell apart. Finally, the T-64B is the last and most modern variant of the T-64 to be fielded.

The seventh and last member of the T-64 series is the T-64K command variant. This model is identified by the presence of an additional radio antenna-base mounted in front of the commander's position, the lack of an

antiaircraft machinegun at the commander's position, and an additional storage tube for the new antenna mast fitted to the turret bustle box. When the ten meter tall antenna mast is mounted on the turret roof, the tank is immobilized by the mast support cables required to hold it in place. The T-64K is normally used by both battalion and regimental commanders and will not be found below battalion level. Apparently, the T-64K is solely based upon the T-64A since this variant has been seen with both T-64B1 and T-64B equipped units.

IMPROVED FIREPOWER

The T-64 is fitted with the 2A46 D-81TM Rapira-3 125mm main gun. It was the largest main gun mounted on any tank in the world, and its destructive power is impressive. After its original use on the T-64 the 125mm main gun was also used on the T-72 series and T-80 series tanks. There are, however, some reports of dispersion problems with the gun's ammunition. These problems were probably caused by poor quality control of the production of the initial batches of ammunition. The gun's maximum effective range is somewhere between 1500 and 2,000 meters. For engagements beyond this range, the T-64B can fire the AT-8 ATGM interchangeably with the conventional High Velocity, Armor Piercing, Fin Stabilized, Discarding Sabot (HVAPFSDS), High Explosive, Antitank, Fin Stabilized (HEAT-FS), and

Fragmentation, High Explosive (FRAG-HE) ammunition. The gun is fed by a "Korzina" (basket) autoloader that allows the vehicle crew to be reduced to three men, and enables the tank to fire six to eight rounds per minute. Since the Iran-Iraq War and Operation Desert Storm, a drawback of this main gun has been identified. According to the Iraqis, the 125mm main gun has a barrel-life of only about 120 rounds. The secondary armament of the T-64 consists of a coaxial 7.62mm PKT machinegun and a 12.7mm NSVT antiaircraft machinegun. The T-64 series and the singular T-80U are the only Soviet tanks that can fire their commander's NSVT machineguns while the tank is fully buttoned-up.

Another dramatic change in the T-64 was a modern fire control system, based upon the TPD-2 coincidence rangefinder. It gave the T-64 a long range capability that previously had been reserved for Soviet heavy tanks. It is very likely that the deployment of a tank with the capabilities of the T-64 convinced the Soviets that the highly regarded heavy tanks were no longer required. Accurate, long range fire could now be provided by a premium tank. As mentioned above, this capability evolved still further as the T-64 was fitted with a laser rangefinder.

INNOVATIVE ARMOR PROTECTION

Any examination of the T-64 will uncover the most controversy in the subject of armor protection. The Soviet Army's preoccupation with ATGM development and deployment by the NATO armies was well known and well founded. This keen interest was initially based upon the demonstrated capabilities of weapons carrying HEAT warheads. ATGMs were being deployed that had the power to penetrate the thickest armor carried by any tank in the world. The Soviets realized that something had to be done to counter this increasing NATO capability. Although the Soviets had been working on new and innovative steel-ceramic composite armor since 1940, it was not until 1967 that this new armor made its appearance. The T-64 was the first tank in the world to be fielded fitted with multi-layer laminate and composite armor.

Composite armor is basically a type of armor plate incorporating different materials in its design. The theory was that by combining both metallic and non-metallic materials, the armor presented multiple and varying materials for an incoming round to penetrate. The intent of this new armor was to maximize the protection provided against HEAT warheads, while at least maintaining the same level of protection provided by conventional steel armor against other types of weapons. Tank turrets were cast

incorporating an internal "cavity" on both sides of the main gun at the turret front. These cavities could then be filled with a ceramic material to create the desired metallic/non-metallic combination. When production of the turret was completed, the sealed cavities in the frontal armor were not visible to any external examination. From a distance, the T-64's composite armored turret appeared basically the same as the standard all steel cast turrets used on earlier MBTs. According to Soviet Military Power 1986, the latest models of Soviet tanks (to include the T-64) were fitted with improved armor incorporating laminates and composites.

While the exact design and type of ceramic materials used in the T-64's armor is classified, the defense related press has published enough unclassified information to make a discussion of the armor possible. Several sources agree that, in order to limit the tank's weight originally to 38 tons, the inherently heavy composite armor was limited to the front of the turret. The use of a cast turret design as explained above, opposed to the slab-sided welded construction of more modern composite armor equipped tanks, does not in any way rule out the use of composite armor. According to Weapons and Tactics of the Soviet Army: Fully Revised Edition, "the turret is reported to be cast with a frontal cavity that could accommodate a variety of fills, most probably alternating layers of ceramic or other

material with steel."[5] In 1985, the Japanese magazine **TANK** also published a drawing of a sectioned view of a modern Soviet tank turret. The drawing included large squares or boxes (not to be confused with reactive armor) placed inside the turret frontal armor on either side of the main gun. It is interesting to note that the shape of the turret fronts of the different variants of the T-64 has undergone a subtle reshaping and redesign since the tank was originally fielded. It seems very likely that as the T-64 evolved, the tank's original turret composite armor was increased and modified to counter more powerful threats.

The U.S. Army had also experimented with composite armor during the same period with the T-95 premium tank project from 1955 to 1960. These U.S. tests, however, were not considered sufficiently successful to warrant the application of composite armor in an American tank. While the validity of this decision is debateable, and will be examined in Chapter Four, it basically ensured that American tanks would carry less effective armor protection than their potential opponents until the fielding of the M1 Abrams in 1981.

As far as the T-64's glacis armor is concerned, all available sources agree that it consists of some kind of laminate armor. Like the composite armor used to protect the turret, the laminate armor used on the glacis is a

combination of metallic and non-metallic materials. The difference with laminate armor is that the materials used are in the form of different layers set up like a sandwich. Since the hull of the tank is made up of welded armor plates, the Soviets were able to simply lay one layer of a given material on top of the other until the desired level of protection was reached. Once the design was set, these alternating layers were bonded together to form the laminate armor glacis. The concept was very similar to that used with automobile windshield safety-glass. Safety-glass consists of a laminate with an inner and outer layer of glass and a middle layer of plastic. This combination of materials is not only strong and shatter-resistant, it also confines the damage caused by a significant impact to a very limited area. That was the basic intent of Soviet laminate armor. Like its historic predecessor the T-34, the glacis of the T-64 was also very well sloped and forced the majority of enemy antitank rounds to glance off the armor.

According to Soviet Tanks and Combat Vehicles, 1946 to the Present, "the hull glacis plate incorporated a layer of ceramic armor beneath the initial layer of conventional steel armor."[6] International Defense Review also published a copyrighted drawing of a sectioned view of the Soviet T-80 and T-64B glacis armor in February 1987. This drawing clearly shows the laminate armor to consist of an outer layer of steel, a middle layer of glass-fiber, and an

inner of layer of steel. The actual thickness of this composite armor array is given as 200mm. The T-64's glacis armor, like the frontal armor of the turret, has gone through some subtle changes over the years. Most likely the original base laminate armor has been upgraded to increase the protection level against improving threats.

IRAQI USE OF LAMINATE ARMOR

Finally, conclusive information concerning Soviet laminate armor has become available since Operation Desert Storm. Photographs of knocked-out Iraqi T-72M1 MBTs clearly show their front-slope armor to consist of a five-layer armor array with two outer layers of steel, two middle layers of non-metallic material, and a single inner layer of steel. Although the armor fitted to the T-64 is certainly more advanced than that carried by the T-72M1, the photographs do confirm the design of at least one type of Soviet laminate armor, as well as the quality of the tank armor they are willing to provide to their allies.

APPLIQUE ARMOR PROGRAM

The T-64 was also included in a four phase applique armor program that was intended to increase the level of protection provided to tanks already in the field. To date, four different types of applique armor have been identified,

although only three have appeared on the T-64. The first phase of this program involved the fitting of a multiple piece nonmetallic armor "blanket" to the turret roof, turret rear, and hull decking above the driver's position. The armor blanket appears to be approximately 35-50mm thick and similar in design to material used in body armor. The intent of this armor was clearly to provide additional protection against the increasing capabilities of Western top-attack and smart antitank munitions. The next phase in this program involved the addition of a conventional steel "face-plate" to the tank's original glacis armor. These face-plates, also seen mounted on T-80 premium tanks and T-72M1 MBTs, add an additional 30-40mm thick layer of armor to the tank's front slope. This new applique armor can be identified by its shape since it had to be cut to fit over and around the tank's tow hooks and mineplow attachment points. The resulting "cookie cut-out" holes and required additional welding are clearly visible.

SOVIET REACTIVE ARMOR

The third phase of the applique armor program that involved the T-64, as well as the T-80 and eventually the T-72 and T-55, was the employment of reactive armor, at figure 5. First identified mounted on Israeli tanks taking part in Operation Peace for Galilee in June 1982, reactive armor would prove to be a huge problem for NATO forces.

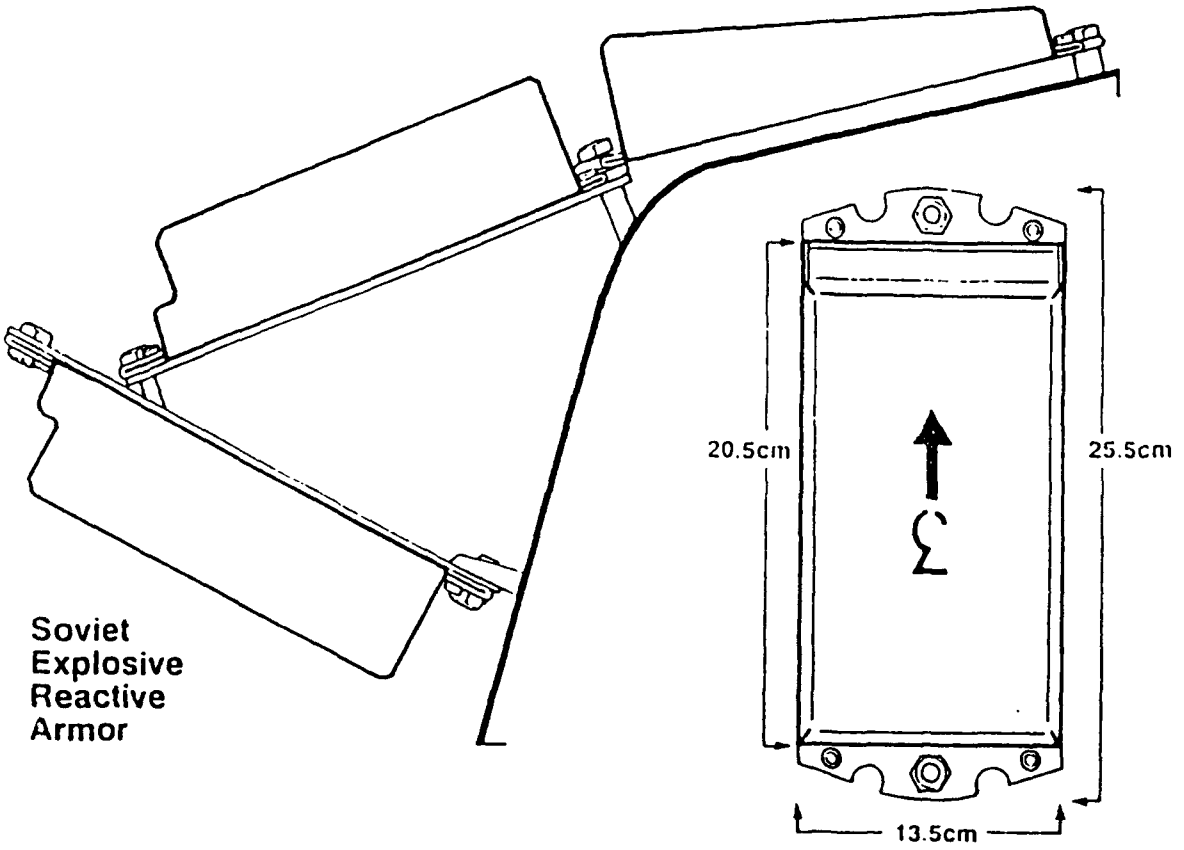


Figure 5-Soviet Explosive Reactive Armor
Source: Armor/Antiarmor Briefing, TTC 1989

Soviet reactive armor, first seen mounted on the T-64B in 1984, was originally only associated with Soviet premium tanks. It is likely that initially the missile-firing premium tanks were fitted with reactive armor to give those tanks additional protection since they were required to remain stationary while guiding the AT-8 ATGM to its target. As the numbers of T-64B and T-80 premium tanks increased in what was then East Germany, the number of reactive armor equipped tanks facing NATO also increased. Suddenly, the NATO armies were confronted by a new armor system that threatened the effectiveness of a key conventional weapon in their arsenals, the ATGM. According to Jane's Defence Weekly, "if the Soviets are fitting reactive armor to tanks already fitted with laminate armor, then they could well have complete protection against ATGMs on which NATO relies for much of its antitank defensive capability."[7]

Soviet reactive armor, probably developed during the 1970s, consists of a large number of metal boxes mounted to the turret front, turret roof, front slope, and hull skirting of each tank. The boxes are attached via two studs or mounting points that are welded on to the tank's main armor. Each box, either a wedge shaped or flat rectangle, contains a layer of explosive and a steel "flying plate." The reactive armor explosive is detonated by the impact of an incoming HEAT warhead. The resulting explosion forces

the flying plate out of the box and into the direction of the attacking warhead. The molten jet that HEAT warheads use to burn through armor plate is then malformed and defeated by the flying plate. The key limitation to reactive armor is that it is designed to defeat unitary shaped-charge HEAT or ATGM warheads. Therefore, as currently configured on the T-64 and T-80 Base Model premium tanks, its capabilities represent no threat to the performance of kinetic energy armor piercing ammunition.

To date, the T-64B has been seen fitted with one of two different reactive armor configurations; the initial configuration in 1985, and the current configuration in 1988.[8] The current configuration brings the T-64B on line with the reactive armor fitting used on the T-80. With the employment of reactive armor on tanks already carrying composite and laminate armor, the Soviets may have been able to achieve nearly the same level of protection as the more modern and complex Chobham type armor more recently adopted in the West. The significance of the deployment of reactive armor can easily be measured by the massive reaction it caused in the armies of NATO. NATO forces realized that they suddenly were opposed by tanks that carried frontal armor that was beyond the capabilities of their huge fielded inventories of ATGMs. Crash programs were started to improve existing systems and develop new ones to counter reactive armor. New ATGMs like the TOW-2A, HOT-2T, and

MILAN-2T were developed and rushed to the field for the sole purpose of defeating tanks fitted with reactive armor. The impact caused by the introduction of premium tanks equipped with reactive armor changed the face of the armor-antiarmor battle. The three phases of the applique armor program that involved the T-64 gave that now aging premium tank the longevity and improved capabilities it needed to stay competitive with the most recently fielded MBTs in NATO.

INNOVATIVE ENGINE

Like the vastly improved firepower and innovative armor discussed above, the T-64's engine was also truly innovative. The 5TDF flat, five-cylinder, horizontally opposed, 750-hp diesel engine has been the subject of heated speculation since the tank went into production 26 years ago. There have been reports that this engine, and its associated transmission, were plagued by problems and subject to frequent breakdowns. These problems were reported to be so severe that the T-64's initial deployment, with the 100th Guards and the 41st Guards, was dictated by the units' proximity to the T-64 tank plant at Kharkov.[9] These problems, like the other reported deficiencies, most likely refer to the Base Model of the tank and have been exaggerated over the years. However serious those automotive problems actually were, they were not severe enough to stop the production and forward deployment of the

T-64. If the tank's performance was not up to the standards set for it and its stablemates, the BMP-1 and BMP-2 IFVs, it surely would not have been allowed to proceed. The Soviets were apparently satisfied with the combination of this new engine and new suspension system, which incorporated both track support rollers and small stamped road wheels.

The T-64 was first seen in the West when it was deployed to the Group of Soviet Forces Germany (GSFG), now known as the Western Group of Forces (WGF), in 1976. NATO's surprise at the appearance of this very innovative tank was amplified by the fact that it was already 11 years old. As stated above, the reaction the T-64 caused in the NATO forces was massive. Suddenly, NATO tank crews faced a Soviet tank which, in spite of some well publicized shortcomings, was better than anything NATO had to offer at the time. This 26 year old tank, still mistakenly referred to as a failure by some sources, remains dangerous enough to help drive the U.S. Army's current push for new and more effective antiarmor weapon systems.

CONCLUSION

The historic appearance of the Russian T-34 premium tank in World War Two seems to mark only the first example of the Soviet Army surprising its enemies with a new and very innovative tank. This capability was demonstrated a

second time with the fielding of the T-64. Had the T-64 gone into battle against the NATO MBTs of the 1960s and 1970s, it would have certainly proven its superiority. Although the fielding of the T-64 was directed against only the potential enemies of the Soviet Army, its impact is still being felt today. If we are surprised again, as the Germans were with the T-34, and the NATO armies were with the T-64, a future adversary may achieve a critical advantage and force the U.S. Army into a third and decisive crisis in tank and antitank warfare.

END NOTES

CHAPTER THREE

1 Steven J. Zaloga and James W. Loop, Soviet Tanks and Combat Vehicles 1946 to the Present (Dorset: Arms and Armour Press, 1987), 61.

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3 "The T-80 Tank Unveiled," Jane's Defence Weekly, 3 May 1986, 803.

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9 David C. Isby, Weapons and Tactics of the Soviet Army, Fully Revised Edition (London: Jane's Publishing Company, 1988), 140.

CHAPTER FOUR

DISCUSSION AND ANALYSIS

The evolution of the premium tank from the T-34 to the most recently developed T-80U, includes several distinctive elements. While one of these elements was not a part of the Soviet experience, the others were critical to the Soviet premium tank's successful past and provide some insight into what may lie ahead for premium tanks in the future. These key elements are focused around the role played by the Soviet heavy tank, the significant Soviet ability to keep new weapons secret, the American T-95 premium tank project, and the growing exports of increasingly capable MBTs.

POST-WAR SOVIET HEAVY TANKS

On 7 September 1945 the Victory in the Pacific parade was held in Berlin. Of all the units and vehicles taking part in this well publicized event, the most significant were the heavy tank units of the 2nd Guards Army

and their new IS-3 heavy tanks. This was the first time that these surprising new tanks were shown to the public. Nicknamed the "Shchuka" or Pike because of its sharply pointed front slope and bow, this heavy tank sent a shock wave through the tank design agencies in the West. In appearance, the IS-3 was as revolutionary as the T-34, and its excellent ballistic shape and powerful 122mm main gun "would have a profound effect upon United States tank development during the post war years."[1]

The IS-3 heavy tank reached the front as the war was coming to a close, and therefore saw only limited combat during the battle of Berlin. The IS-3 and the improved IS-4 heavy tank went into production in late 1944. The IS-4 was fitted with a larger and more powerful engine than the IS-3, and required the use of a longer hull employing seven road wheels per side instead of the six on the IS-3. This new engine also allowed more armor to be added to the hull sides of the IS-4. The IS-3 Base Model was followed by an improved variant known as the IS-3M, at figure 6, which incorporated a new engine and other mechanical improvements into the original design. These Soviet heavy tanks, the products of the Ya. Kotin and L. Dukhov design bureau, were produced in relatively small numbers with a total production of approximately 350 IS-3s and 250 IS-4s.[2]

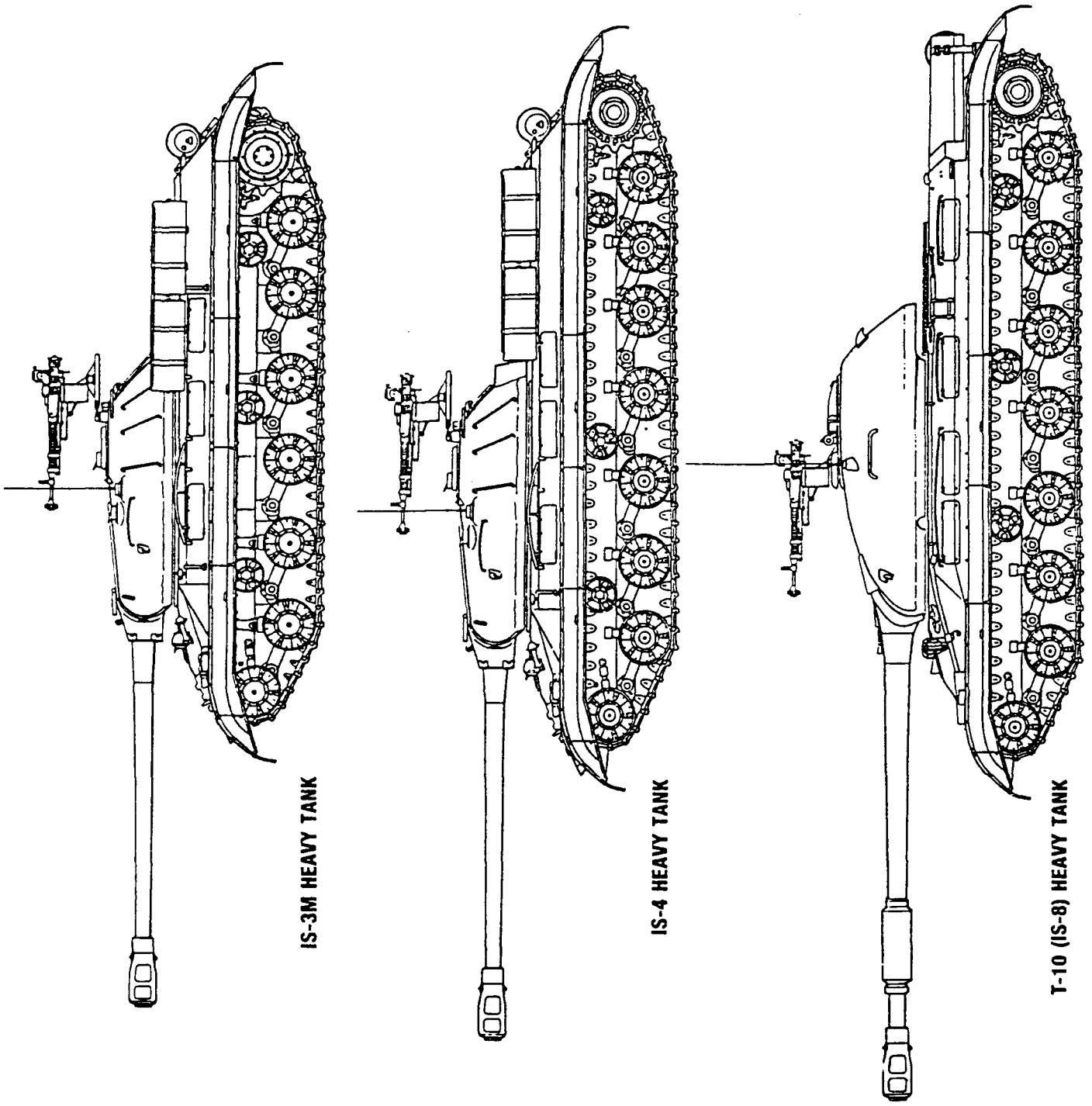

Figure 6-Soviet Heavy Tanks
Source: Soviet Tanks and Combat Vehicles 1946 to the Present, by Steven J. Zaloga

IMPACT OF THE HEAVY TANKS

The revolutionary design and advanced capabilities of the IS-3, IS-3M, and IS-4 heavy tanks, combined with the significant reaction they caused in the West, confirm their position as premium tanks. While not as dramatic as the reaction forced upon the Germans by the T-34, the U.S. Army found itself in a similar position at the outbreak of the Korean War in June 1950. The U.S. Army quickly realized that the North Korean employment of Soviet T-34/85 premium tanks posed a serious problem. This problem, however, was only part of what had the potential to be a disaster. The U.S. Army was suddenly faced with a combat situation that could include the employment of the IS-3, IS-3M, or IS-4 heavy tanks in Korea. The American Army had no tanks in its inventory that were capable of successfully taking on the Soviet heavies. The U.S. was forced to scramble to put the still developmental 60 ton T43 heavy tank into limited production in December 1950. This new American heavy tank, however, was not ready for combat, and was not standardized as the 120mm gun combat tank M103 until 26 April 1956. Had the Korean War included the use of the post-war Soviet heavy tanks, the American forces would have been faced by enemy tanks that were clearly superior to their own.

POST-WAR HEAVY TANKS IN COMBAT

Although Soviet heavy tanks have been seen on many occasions, including the invasion of Czechoslovakia in August 1968, the only known combat employment of these tanks since World War Two was during the Six Day War in 1967. As part of the Egyptian 7th Infantry Division at Rafah and the 125th Tank Brigade of the 6th Mechanized Division at Kuntilla, the Egyptian Army deployed Soviet IS-3Ms against the Israelis. The much more modern Israeli M48 and Centurion MBTs had little difficulty in destroying the old heavy tanks. During the fighting Egypt lost a total of 73 IS-3Ms either destroyed or captured by the Israeli Army. In spite of these losses, it was reported that the Egyptian Army still had one regiment of the IS-3Ms in service in 1973.[3]

THE LAST SOVIET HEAVY TANK

With the development and fielding of the IS-4 complete, the Kotin and Dukhov design bureau started to concentrate on new heavy tank designs. A series of heavy tank projects was studied with designations ranging from IS-5 through IS-7. The IS-7 heavy tank, designed by the N. Shashmurin design group, was intended to be a tank of the future. The IS-7 mounted a specially designed semi-automatically loaded 130mm main gun and five large

caliber machine guns. The tank weighed 60 tons and was powered by a 1000 hp diesel engine which gave it a maximum speed of 60 kph.[4] According to the tank's designer, the IS-7's weight was considered to be excessive; and as a result, the IS-7 was heavily modified to yield the T-10 heavy tank in 1950. While some sources state that this new heavy tank was fielded with Soviet units in 1953, it was not until the 7 November 1957 Moscow parade that the T-10 was finally shown to the public. Apparently the T-10's original designation of IS-8 was changed after Stalin's death as part of Khrushchev's de-Stalinization program.

The T-10, at figure 6, was fitted with an improved 122mm main gun which had a maximum effective range of approximately 1200 meters. The gun fired two different types of two-piece antitank ammunition; Armor Piercing High Explosive (APHE), and non-rotating fin stabilized High Explosive Antitank (HEAT). The secondary armament consisted of two 12.7mm DShK machine guns; one mounted at the loader's position and one mounted coaxially to the right of the main gun. The T-10 was powered by a V-2-IS (V2K) V-12 700 hp water cooled diesel engine, which gave the 50 ton tank a maximum speed of 42 kph. The armor protection fitted to the T-10 was one of its strongest characteristics. While the first use of composite and laminate armor was still several years away, the conventional armor plate carried by the T-10 was still very impressive. The turret frontal armor was

250mm thick at the mantlet, and the front slope or glacis armor varied from 230mm at the tank's center line to 120mm near the hull sides. Several open sources credit the T-10 as having the thickest conventional armor of any tank of its time.

During the 1954-1962 time frame, an improved variant of the T-10 was produced known as the T-10M heavy tank. The 52 ton T-10M, which was probably issued to Soviet units in 1957, incorporated several improvements over the T-10. The 12.7mm DShK machine guns were replaced by the more capable 14.5mm KPV and KPVT heavy machine guns, and the 122mm main gun was fitted with a multi-baffle muzzle brake. The T-10M was also equipped with full stabilization for the main gun to allow for more accurate fire while on the move, and full active infrared night fighting equipment. Finally, the T-10M was also equipped with a Nuclear, Biological, and Chemical (NBC) overpressure protection system to protect the tank's crew while operating in a contaminated environment.

HEAVY TANKS AND THE MODERN PREMIUMS

The significance of the T-10 and T-10M heavy tanks, as well as their relationship to the modern premium tanks, can be determined by examining the system used to finally retire the well respected heavy tanks. The T-10 and T-10Ms were reportedly withdrawn from front line service with the

Soviet Army during the 1970s. According to Soviet sources, the tanks were either going to be scrapped or sent to the Soviet-Chinese border and employed as border strongpoints. Historically, the Soviet Union has deployed small numbers of older tanks as pillboxes or blockhouses on its frontiers. These positions were normally sited around remote cities approximately 3 kms behind the Sino-Soviet border. "T-10/T-10M and T-34/85 tanks are known to have been so modified, dug into weapons pits and embedded in concrete with only the turrets visible."[5] In their new static role, the tanks were also fitted with radar fire control systems.

In the early 1980s Soviet sources disclosed that many of their older tanks, long considered obsolete by the West, were in fact still in service with low priority units. The tanks that remained in service included the T-10, T-10M, and IS-3M heavy tanks. The most recently available information concerning the T-10 and T-10M is from a TASS newspaper article that appeared in July 1989. According to the Soviets, in the "spirit of glasnost" the tanks that were not suitable for conversion to nonmilitary status were going to be destroyed. "This means in particular the uneconomic T-10M heavy tanks, in the past the best machine of the tank troops."[6] Apparently, the old heavy tanks were considered valuable and capable enough to be used, although in low priority units, through the late

1980s. Like other Soviet premium tanks, the deployment and disposition of these 35 year old heavy tanks was a well kept secret.

To date, the exact time the T-10 and T-10M heavy tanks were withdrawn from front line service has not been released. The heavy tanks were eventually considered unnecessary and were transferred from the forward deployed Groups of Soviet Forces to lower priority units within the Soviet Union. The reason for this new-found confidence can be found in the fielding of a lighter and more capable premium tank; the T-64. In 1976, when the T-64 was first deployed with the Western Group of Forces (WGF) in what was East Germany, forward deployed Soviet forces were issued a 38 ton tank that was very well protected and was capable of delivering accurate long range fires. The T-64 was able to fulfill the roles of the medium tank as well as the breakthrough and antitank roles that had previously been reserved for the heavy tank. In effect, the T-64 successfully combined the advanced capabilities of the T-10/T-10M heavy tanks with the capabilities of the modern medium tank. It was the "offspring" of this blending of tank classes that allowed the indispensable heavy tanks to be retired, and established the critical position of the modern premium tank.

THE HIDDEN WEAPONS OF THE SOVIET ARMY

As previously mentioned in this study, the Soviets demonstrated their ability to surprise their enemies with new high technology weapons by successfully keeping those weapons secret until they appear in the hands of Soviet troops. The ability to covertly develop, produce, field, and eventually retire key weapons has been a fundamental part of the Soviet experience since the T-34 of 1940. Viktor Suvorov's secret "Mercedes" has taken many different shapes over the years, and has included more than premium tanks. In one case, the existence of a powerful new weapon was kept so secret that the Soviets did not even acknowledge it until after it was retired from front line service. The secret life of Soviet post-war tank destroyers or heavy assault guns is not only a demonstration of what the Soviets were capable of achieving, but also a successful example of the process that could be applied to premium tanks of the future.

THE IT-122 AND IT-130 TANK DESTROYERS

In November 1977, a previously unseen armored recovery vehicle was identified supporting the Red Square parade in Moscow. The appearance of this new vehicle, which was originally based on the hull of the T-62 MBT, offered the first hint of a new secret weapon. This development was

significant since it betrayed what the vehicle was prior to being put on display as a new armored recovery vehicle. Unclassified photographs clearly revealed that the vehicle's fixed armored superstructure at one time or another, mounted a large caliber main gun. The covered gun emplacement, as well as the provision for what was probably a hull width optical rangefinder, can easily be seen. Although this well photographed armored recovery vehicle was presented for the world to see, the vehicle it was derived from is much more of a mystery.

The Soviets have historically been very protective of their antitank weapons. The only antitank weapons that were openly displayed were those that the Soviets were willing to export. Therefore, new antitank weapons were normally surrounded by a much higher level of secrecy than other weapons. This extra level of protection explains why two key Soviet weapon developments escaped the eyes of western intelligence agencies. The first of these was developed in 1949 as a replacement for the SU-100M tank destroyer. Known as the IT-122, it consisted of a T-54A hull with the new D-49S 122mm main gun mounted in a fixed armored superstructure. In addition to this huge increase in firepower, the IT-122, at figure 7, was also fitted with a narrow-based optical rangefinder in the commander's cupola at the right front corner of the superstructure. This main gun and rangefinder combination gives the indication that

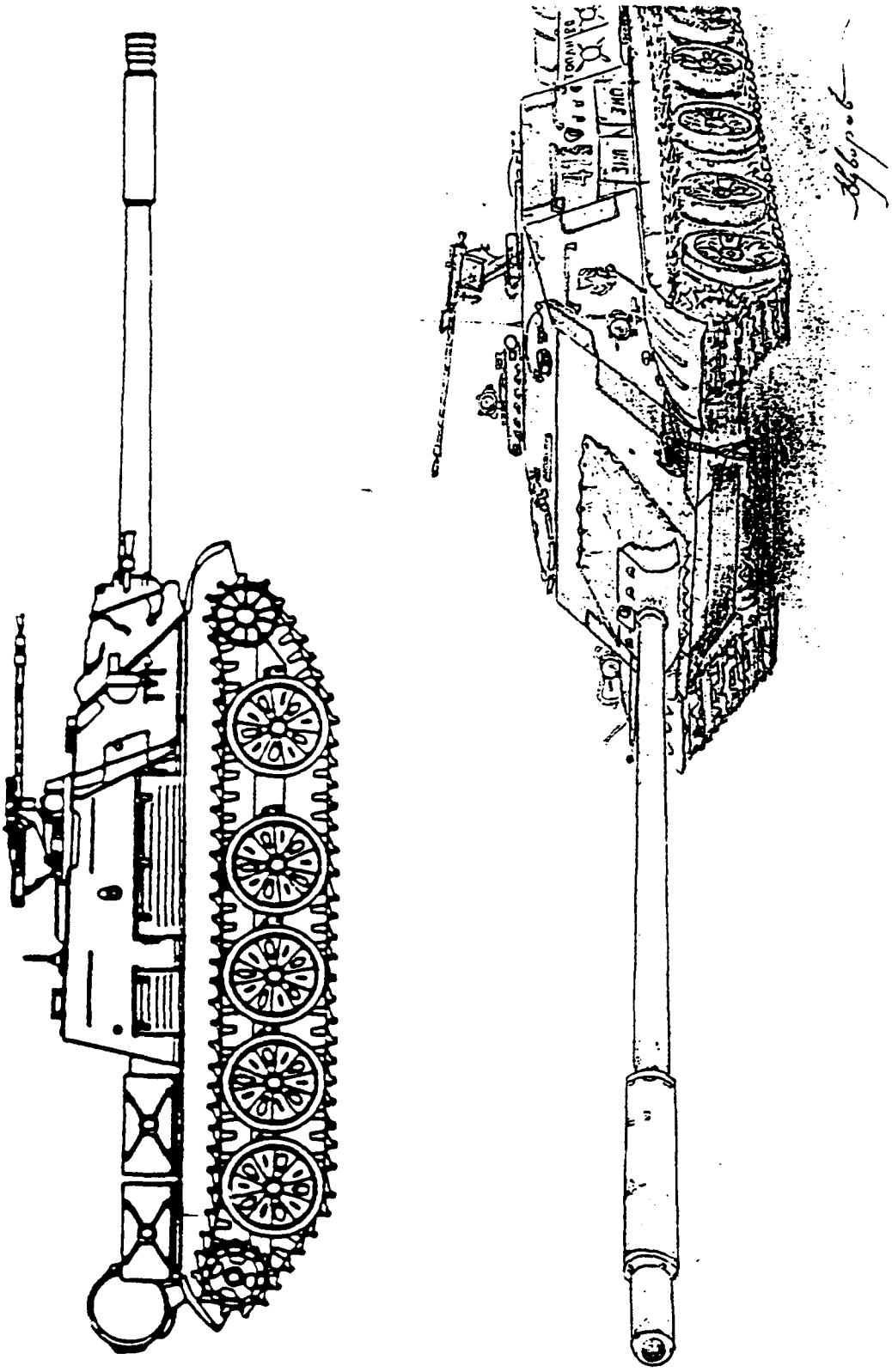

Figure 7-Soviet IT-122
Source: Top Drawing, Armor/Antiarmor Briefing, TTC 1989
Lower Drawing: International Defense Review, June 1983

the IT-122 was intended for long range engagements against NATO heavy tanks.[7] This rangefinder was very advanced for its time, and it was not until the deployment of the T-64 premium tank in 1967 that a Soviet tank was given the same capability.

Although the IT-122 tank destroyer was very rarely seen, the research conducted for this study did provide two different photographs of the IT-122. The first photograph was taken during the 1967 Operation Dniepr summer exercise, and shows a panoramic view of Soviet armor including many IT-122s. The second photograph is of much better quality and shows a close view of a lone IT-122 bogged down in the mud. The details of the vehicle can clearly be seen, including the location and type of main gun fitted, and the rangefinder at the commander's position. While the basic design of the IT-122 is very similar to the tank destroyers used during World War Two, it was very advanced for its time.

Even more mysterious than the IT-122, is that vehicle's successor, known as the IT-130 tank destoyer. The IT-130 consisted of a T-62 MBT hull fitted with the M-76T 130mm main gun mounted in a fixed armored superstructure. Although the IT-130 was very similar in concept and design to the earlier IT-122, the IT-130 was apparently fitted with a more advanced rangefinder. In this case, the optical

rangefinder had a much wider base, running the entire width of the vehicle. This new configuration gave the IT-130 even greater capability to destroy NATO tanks at extreme ranges. As mentioned above, the location of this improved rangefinder can still be determined by examining the IT-130-based armored recovery vehicle first seen in 1977. While both the armored recovery vehicle and the IT-130 were based on the T-62, the armored recovery vehicle is clearly a variant of the more capable tank destroyer. To date, the only photographs to appear relating to the IT-130 have been of the "de-fanged" armored recovery vehicle.

There is some speculation in the available literature to suggest that the armored recovery vehicle variant of the IT-130 was created and displayed to the public for the benefit of Western intelligence. Based on the use of the IT-122 during an exercise in 1967 and the deployment of the IT-122 during the invasion of Czechoslovakia in 1968,[8] the Soviets may have felt that some disinformation was required to maintain the secrecy surrounding their tank destroyers. The message sent to the West was clear: the Soviets had developed tank destroyers but they were not successful. A small number of these vehicles were then converted into armored recovery vehicles and displayed to convince Western intelligence agencies that the development of Soviet tank destroyers had ceased. In spite of the fact that the Soviets have recently confirmed

the existence of the IT-122 and released a drawing of it, the disinformation effort was apparently successful. To date, there has been no official recognition of either the IT-122 or the IT-130 from the West.

According to Viktor Suvorov, certain key Soviet weapon systems were never demonstrated or displayed to the West. Instead, they "remain unknown from their birth, throughout their secret life and often, even after their death."[9] This was certainly the case with the IT-122 and IT-130 tank destroyers. This process, however, was not limited to tank destroyers. Soviet premium tanks were also shrouded in secrecy and only shown at a time that suited the Soviet Army. The difference between the tank destroyers and premium tanks lies with the much greater number of premium tanks that were required. If only a very small number of T-64s or T-80s were fielded to very select units, they may have also lived and died in secrecy.

The development of the Soviet tank destroyer, like the projected premium tank, has certainly continued beyond those examples discussed above. The new combination of the long barreled 152mm field gun of the Soviet 2S5 self propelled gun, and the hull of the T-64, T-72, or T-80 could have been fielded in the late 1970s or early 1980s. The resulting "IT-152," would still be secret, awaiting a period of "acute tension" to make its appearance. The development

and deployment of the Soviet tank destroyers discussed above confirms that key weapon systems can be kept secret until their secrecy is no longer required. Given the same effort and priority that the Soviets gave to their premium tanks and tank destroyers, a new premium tank development could achieve the same level of success. The Soviets have provided a past example of the process that may represent the threat of the future.

THE AMERICAN T-95 PREMIUM TANK PROJECT

The use of high risk technology can be defined as the employment of any technology of unproven design or capabilities. The fielding of a weapon system incorporating this type of technology would certainly be regarded as a gamble or high risk. The decision to take this gamble or to continue with aging but more secure technologies, is critical to the future of any new tank development program. In an effort to capture and employ the cutting edge of tank technology, the U.S. Army initiated a program to develop a radically new tank to replace the brand new M48 Patton and still to be developed M60 series of MBTs. An examination of the American T-95 premium tank project not only provides a look at the only known non-Soviet premium tank, it also demonstrates the significance of vision and missed opportunities.

In January 1955 one of a series of long range tank development proposals originally known as the TL-1 concept was designated as the 90mm gun tank T-95. The T-95 would prove to be the main tank development project in the U.S. Army for the next five years. The T-95 was intended to include the extensive use of innovative and unproven technologies. These innovations were focused in the three classic tank design areas of firepower, mobility, and protection. The T-95 Base Model, at figure 8, was fitted with the innovative T208 90mm smoothbore non-recoiling main gun. This new fixed main gun had many advantages over conventional recoiling guns. The new gun and its associated mount was lighter, required a smaller opening in the front of the tank's turret, and took up less space inside the turret. While all of these points are significant, the most important aspect of the new gun was its ammunition. It fired the revolutionary new Armor Piercing, Fin Stabilized, Discarding Sabot (APFSDS) round at a muzzle velocity of approximately 1585 meters per second. This ammunition, which looked and performed very much like the 115mm HVAPFSDS round fired by the Soviet T-62, gave the T-95 a level of firepower that was similar to that achievable today.[10]

THE OPTAR RANGEFINDER

Another important part of the T-95's firepower consisted of a revolutionary fire control system

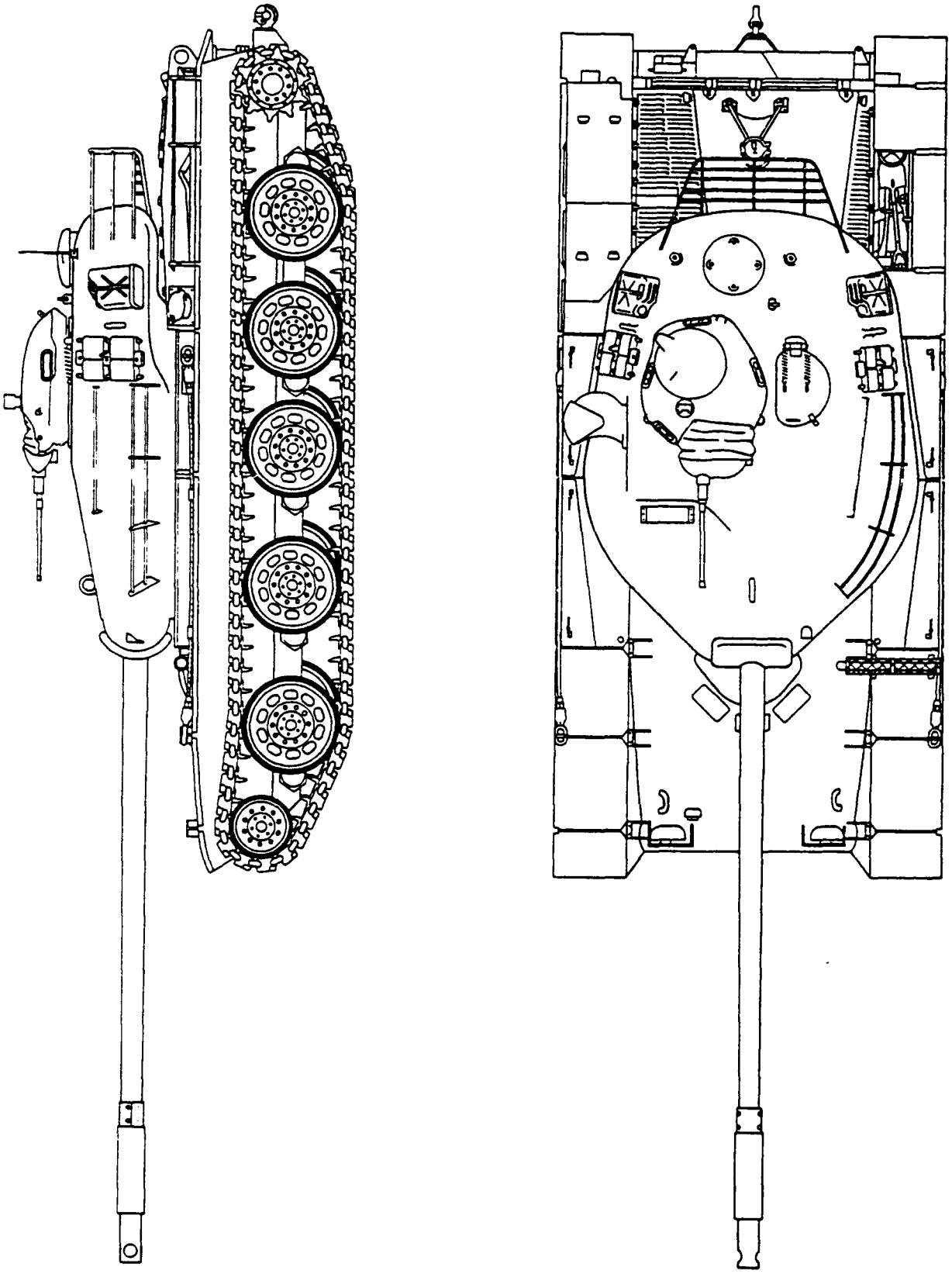

Figure 8-The T-95 Base Model
Source: Abrams: A History of the American Main Battle Tank, by R.P. Hunnicutt

incorporating the Optical Tracking Acquisition and Ranging (OPTAR) rangefinder. The T-53 OPTAR rangefinder consisted of a light-beam emitter, a receiving unit, and an offset telescope system. The rangefinder head assembly projected out from the right side of the turret, and was protected by a large armored cover. The system was designed to enable the tank commander to lay the rangefinder on a target, and by pressing a button, fire a single pulse light beam. This light beam would then reflect off the target and return to the receiver. The range data would then be processed and given to the tank commander as a range readout. This system, however, did have some problems. Since the OPTAR used a noncoherent beam of light, the beam had a tendency to scatter, resulting in multiple returns to the receiver. The tank commander was then required to visually estimate the target's range and determine which of the light beam returns and range readouts were correct. Despite this problem, which still exists in certain circumstances, the OPTAR rangefinder of 1955 was certainly ahead of its time; and would prove to be the forerunner of today's laser rangefinders.

THE MOBILITY AND PROTECTION OF THE "AMERICAN T-64"

The mobility of the T-95 was given a very high priority. The tank was powered by the Continental Model AOI-1195-5 8-cylinder, 180 degree horizontally opposed

piston engine. This very innovative 560-hp engine gave the 42 ton T-95 a maximum speed of 35 miles per hour. The most interesting point concerning this engine is that it was of virtually the same design as the 5TDF horizontally opposed 750-hp engine used by the Soviet T-64. Like the engine used by the T-64, the T-95's engine displayed some problems during initial automotive testing conducted at Fort Knox. Unlike the Soviet experience, however, the U.S. Army felt the problems with the new engine were too significant to justify its continued development. Later variants of the T-95 were subsequently equipped with more conventional "V-type" diesel engines. One of the final developments associated with the automotive testing conducted with the T-95, concerns the installation of a gas turbine engine. One of the later T-95 variants known as the T-95E8 was displayed at the Pentagon with the Solar Saturn 1,100-hp gas turbine engine in March 1961.

Since the end of World War Two, the U.S. Army had been concerned with the capabilities and increasing potential of antitank weapons employing High Explosive Antitank (HEAT) warheads. Early ideas aimed at improving the armor protection carried by American tanks included simple spaced armor and an asphalt and pebble composition known as HCR-2.[11] Since these armor designs did not offer a workable solution, the Continental Army Command initiated a program in 1952 to develop a new type of tank armor. This

new armor was intended to provide protection against HEAT warheads, without sacrificing the level of protection provided against the kinetic energy of the APFSDS ammunition. Development of tank armor with this capability would prove to be a challenge since the characteristics of HEAT and APFSDS antitank ammunition are very different in relation to the penetration of armor plate. Therefore, a type of armor that is very effective against HEAT ammunition, may not provide protection against kinetic energy APFSDS attack.

AMERICAN COMPOSITE ARMOR

This advanced armor development program was combined with the T-95 premium tank project in April 1957. The type of armor that was eventually chosen for incorporation with the T-95 was the very innovative fuzed silica composite armor. Silica, or glass, was chosen for the composite material because it does not "flow plastically" after an impact like steel does. Silica, instead, rebounds after the shock wave and disrupts the molten metal jet that HEAT rounds use to burn through armor plate. The desired result was that the molten metal jet formed by an impacting HEAT warhead would dissipate in the fuzed silica, and not have enough energy remaining to penetrate interior steel armor protecting the tank's crew.

Thirty six siliceous-cored composite armor T-95 turret and hull castings were produced to support a series of ballistic tests conducted from 1 June 1958 to 1 August 1960. The castings themselves consisted of an outer layer of about one inch of steel, a center layer of about four inches of fuzed silica, and an inner layer of about two inches of steel.[12] The purpose of the live-fire testing was to test the performance of the new composite armor against the antitank weapons that were in use at the time. Of all the ammunition fired against these T-95 castings the most interesting was the single Soviet 100mm Armor Piercing, High Explosive (APHE) round. The Soviet APHE round hit the glacis plate casting and displaced a piece of the outer steel armor approximately three feet wide. The entire area from the glacis plate's inner layer of steel back to the rear of the hull, however, was undamaged. The new composite armor, although severely damaged by the impact of the APHE round, was not penetrated.

In spite of its impressive performance the new composite armor did have some limitations. First, an impact by either a HEAT or kinetic energy round would pulverize an undetermined amount of the fuzed silica. This would occur whether or not the round actually penetrated the armor. Second, an impact from a non-penetrating kinetic energy round could cause severe damage. This damage could range from the displacement of outer steel armor, like the APHE

projectile impact discussed above, to large scale fuzed silica pulverization. In either case, the effectiveness of the armor against a subsequent projectile impact would be greatly reduced. Although these limitations were confirmed by the testing conducted, it was determined that fuzed silica composite armor provided superior protection against HEAT warheads, and at least equivalent protection against kinetic energy projectiles as that of an equal weight of conventional steel armor.[13]

In spite of the capabilities and huge potential of fuzed silica composite armor, it was never used in a an American production tank. While the "Special Armor" that was eventually adopted by the U.S. Army for the M1 Abrams MBT was far superior to the composite armor tested for the T-95, it did not reach the troops until 1981. As a result, American tank crews were protected by much less effective armor protection than their potential opponents for the following 21 years.

THE "FAILURE" OF THE T-95

The T-95 premium tank project, that grew to include nine different variants, was terminated on 7 July 1960. The problems that were encountered with the numerous innovative technologies were considered too great to be overcome. The problems were a result of what some sources

refer to as "over optimistic goals" and excessive expenditures. The result of this historic evaluation was the classification of the T-95 project as a failure. The actual failure, however, was not one of hardware or technology; instead, it was a failure to recognize a weapon system that was truly ahead of its time. The U.S. Army was not prepared to take the gamble that fielding a tank with the problems associated with a high velocity smoothbore main gun, an innovative engine, and revolutionary composite armor would represent. In effect, the premium tank was considered to be out of reach. By comparison, the Soviet premium tank of exactly the same era was put into production in 1965. The T-64 suffered through many of the same initial problems that were encountered by the T-95, and was consequently also mislabled as a failure. The difference was that the Soviets recognized the premium tank for what it was, and were willing to take the required gamble. As discussed in detail in Chapter Three of this study, the Soviet gamble paid off with the T-64 premium tank; a tank that would prove to be superior to any other of the 1960s or 1970s.

The termination of the T-95 premium tank project was a hallmark event in American armor development. While firmly establishing the secondary position of American tanks for basically two decades, the lack of vision displayed by the decision makers involved is an important lesson for others who may develop a new premium tank. The employment

of high risk technology in a premium tank will certainly cause initial teething problems; problems which can, however, be corrected and temporarily accepted. Once such a design is fielded, it can be modified and upgraded as required. Had the T-95 been put into production and fielded in the mid-1960s, not only would American tanks have maintained parity with the Soviet premiums of the day, the current potential of the American tanks that could have fought in Operation Desert Storm would be enormous. The T-95 premium tank project clearly represents a missed opportunity. If the gamble is not accepted, and today's cutting edge of tank technology is kept from the field to be continually fine tuned, the tank that eventually reaches the troops will be nothing more than a reaction to the innovations of others.

THE EXPORT OF THE INCREASINGLY CAPABLE MBT

As previously stated, the Soviet experience of tank development was based on the unique concept of fielding two different tank types in a high-low mix. The low-end of the tank fleet was made up of the Main Battle Tank (MBT). Although less sophisticated and not as capable as the high-end premium tank, the MBT did have the capabilities to be very competitive on the battlefield. In addition to constituting the bulk of Soviet tank forces, the MBT was also exported in large numbers to Soviet allies. Since

Soviet MBTs were continually improved by the incorporation of mature premium tank technology, the exported MBTs deployed throughout the world are still a source of concern. The export of increasingly capable MBTs not only constitutes a continuing threat to the U.S. Army, but also provides a model for the possible export of existing Soviet premium tanks as well as the potential deployment of premium tanks of the future.

THE MODERN SOVIET MBT

The Soviet T-72 MBT was first shown to the public on 7 November 1977 during the Red Square parade in Moscow. The T-72 was, however, displayed one month prior to the parade to the French Defense Minister during his visit to the Taman Guards Motorized Rifle Division in October 1977. Since its debut, the T-72 has become one of the most well known and widely deployed tanks in history. To date, the T-72 is being produced in five different countries, is currently deployed by 16 different countries, and has appeared in 16 different variants. Like other Soviet tanks, the T-72 has undergone a series of modifications in all three of the classic tank design areas. The latest variants of the T-72 have been fitted with improved composite and laminate armor, and have the capability to fire the AT-11 laser guided Antitank Guided Missile (ATGM) from their main guns. While the T-72 has been used in combat in Afghanistan, Lebanon,

and Iraq (against the Iranians), the most recent use of the T-72 was by the Iraqi Army during Operation Desert Storm.

IRAQI T-72s IN OPERATION DESERT STORM

Most of the information concerning the performance of Soviet supplied hardware used by the Iraqi Army during Operation Desert Storm has been very critical. Anecdotal and factual accounts of Soviet T-72s in combat have been particularly negative. A realistic account of the T-72's capabilities, however, should start prior to the initiation of the ground war. The Iraqi Army went into combat employing three variants of the T-72 MBT: the T-72 Base Model, the T-72M/T-72G, and the T-72M1. The T-72 Base Model is the same variant of the T-72 the Soviets paraded in Red Square in 1977. The T-72M and T-72G are included as a single variant because the tanks are virtually the same, and are very difficult to distinguish from one another. The key difference is that the T-72G is a product of either Czechoslovakian or Polish factories, while the T-72M is of Soviet manufacture. The Soviet produced T-72M1 variant was clearly the most advanced of the three, incorporating composite armor on the turret front[14] and improved five-layer laminate armor on the tank's front glacis.

PREPARATION FOR COMBAT AGAINST THE IRAQI T-72s

As the Allied Coalition Forces were preparing for the start of the ground war against the Iraqi Army, they were very concerned about the Iraqi T-72s. This concern can clearly be seen in two high priority Allied armor programs. The first of these programs was conducted by the U.S. Army and involved the "rolling over" of the M1 MBT equipped force to the much more capable M1A1 MBT. The advantages of the M1A1 are well known and include the very powerful 120mm main gun and vastly improved armor protection including Depleted Uranium (DU) armor. The DU or "heavy metal" armor, added to what was already the most effective armor fitted to any tank in the world, gave the M1A1 "heavy" protection that was at least a generation ahead of any competition. In spite of the highest priority given to the program, some of the older M1A1s went into combat without the factory fitted DU armor. This modernization effort also included the U.S. Marine Corps (USMC), that deployed to Saudi Arabia equipped with M60A1 MBTs. At the start of the ground war, however, some of the deployed U.S. Army forces were still equipped with M1s, and the USMC was still fielding a number of M60A1s.

The second armor improvement program involved the fitting of applique armor to those armored vehicles that were considered too lightly armored to go against the Iraqis in combat. This was more of a coalition effort since it

included the British and French forces as well. The British felt that the advanced "Special Armor" carried by their Challenger 1 MBTs was not sufficient when measured against the firepower of Iraqi T-72s. As a result, they added new reactive armor to the front slope and bow of the tanks, and ceramic laminate plates to the tank's conventional hull skirting. These up-armored Challengers were joined by up-armored Warrior Infantry Fighting Vehicles (IFVs), that were also fitted with large ceramic laminate plates on their hull fronts and sides.

The French forces also felt that their armor needed to be improved, and followed this program by adding lightweight applique armor plates to their AMX-10RC armored cars prior to the start of the ground war. The deployed American forces also up-armored some of their fielded vehicles. The USMC added reactive armor plates to the hulls and turrets of their M60A1s, and fitted their AAVP-7A1 amphibious assault vehicles or AMTRACs with P900 lightweight armor mesh sheets.

The American preference for the increased firepower provided by the M1A1's 120mm main gun and its associated M829A1 DU ammunition, can be explained by the requirement to engage and destroy Iraqi T-72M1s from the front. The British felt that their own 120mm main gun mounted in the Challenger 1s still lacked the necessary firepower to deal

with the T-72M1. To solve this problem, a new low pressure version of the L26 CHARM APFSDS round employing a DU penetrator was developed. Although it is not known if this new British round was used in combat, it is clear that both the American and British Armies felt that the best firepower available was required to defeat the Iraqi T-72M1 equipped force.

ASSESSMENT OF THE T-72 MBT

The value of the T-72 MBT should be weighed against the high priority preparations for battle its presence in the Iraqi Army impressed upon the forces of the Allied Coalition. The most common mistake to appear in the open press equates the quality of Soviet hardware with the lack of skill and willingness to fight of the Iraqi Army. The T-72 was designed to fight as part of a complete system, employed by the Soviets on the North German Plain. Fully supported by the other combat arms, the T-72 was intended to move rapidly through the forested and uneven ground of Western Europe by taking advantage of its small size, mobility, and large numbers. Using the relatively short range of its powerful 125mm main gun and its composite and laminate frontal armor to maximum effect, large quantities of T-72s would simply overwhelm the defending forces. While the Iraqi T-72s could certainly have been employed much more effectively than they were, the open desert is not the

environment that best suits the Soviet MBT. An assessment conducted after a European war, however, would certainly show the T-72 to be a very capable opponent. It may, in fact, have been the T-72 that inspired the Soviet military phrase "numbers annihilate."[15]

It can accurately be said that Operation Desert Storm did not truly test the Soviet T-72 MBT. The Iraqi plan of tieing down their MBTs in static defensive positions, and leaving them to the mercy of overwhelming air power would have been a challenge to the capabilities of any armor force. If the lack of skill and will to fight displayed by the vast majority of Iraqi tank crews is included in this assessment, virtually any tank would have appeared to be as much a failure as the Iraqi T-72. If the Iraqi scenario could be replayed with their tanks manned by motivated and capable tank crews, and with the Iraqi T-72s employed more as they were intended, a realistic assessment of the modern Soviet MBT would be possible. While certainly not changing the outcome of the fight, the performance of the T-72 would have justified the massive preparation conducted by the Allies prior to going into battle against it.

THE EXPORT OF THE SOVIET PREMIUM TANK

If the replayed Iraqi scenario, as described above, included more modern and capable variants of the T-72, like the very well protected and missile-firing T-72B, an even more accurate assessment of the modern Soviet MBT would be possible. The employment of T-72s by the Iraqi Army, however, may have only presented a hint of what could happen if the Russian Republic or the Ukraine decided to make previously unavailable premium tanks available for export. Driven by the need for hard currency, the urge to appear as a viable force to the rest of the world, and the desire to develop new mutually supporting alliances, either of these two former Soviet republics could initiate a change of policy regarding premium tanks. It is very possible that the threat imposed by the widely exported T-72 MBT has become basically a threat of the past.

The future armor threat facing the U.S. Army could consist of the much more dangerous T-64B or T-80B premium tanks, possibly employed by North Korean, Libyan, or Iranian forces. If the Iraqis had been equipped with either of these two very capable premiums, the length of the ground war and the amount of success achieved by the Allied Coalition could have been very different. The export of different members of the T-64 series and T-80 series of premium tanks may be inevitable, since the Kharkov tank

plant is located in the Ukraine. While it is currently not known exactly where the T-80 is produced, the very strong similarities between the T-64 and the T-80 indicate that the T-80 is probably produced at Kharkov as well. With the MBT threat of the past and the premium tank threat of the present identified, the U.S. Army must be fully prepared to meet what appears on the horizon. Designed to fight and survive on the battlefields of the 1990s and beyond, the premium tank of the future will be built upon the capabilities of the premium tanks of the past and present. The premium tank of the future, identified as the projected Premium Tank-5 (PT-5) will be examined in Chapter Five of this study. It will be developed and deployed using the product and process of the Soviet experience as a model and may represent the biggest challenge American armor has ever faced.

END NOTES

CHAPTER FOUR

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CHAPTER FIVE

CONCLUSIONS

Since its debut in July 1941, the Soviet premium tank has heralded the use of innovation and high technology in tank design. When compared to the contemporary tanks fielded by its competition, the innovation and high technology incorporated into each of the Soviet premiums resulted in a crisis being impressed upon its opponents. The success of the premium tank did not go unnoticed by the Western Armies that were forced to react to its capabilities. The short-lived American T-95 premium tank project of the 1950s, and the successful American and German programs to field high technology MBTs in the 1980s, are examples of the Western response to the Soviet experience. Prior to the collapse of the Soviet Union in 1991, Western intelligence agencies were very concerned about Soviet innovations that were projected to appear in the near future. While the threat imposed by a future premium tank from the Commonwealth of Independent States (CIS) has been downgraded significantly, the threat of the premium tank

employed by a new adversary demands attention. The task at hand is to identify this threat and respond to it, prior to the imposition of a dangerous third crisis in tank and antitank warfare.

THE PREMIUM TANK-5

The identification of the future premium tank could take place in a wide variety of different scenarios. These possibilities range from the tank being identified during operational testing by U.S. national assets, to it being openly displayed as an export candidate or for the purpose of proving a given country's military prowess. In whatever scenario the future premium tank eventually appears, it will most likely be based on the product and process of the Soviet experience. Following the established line of Soviet premium tank developments; the T-34, post-war heavy tanks, the T-64 series, and the T-80 series, the examination of the future premium tank will be based on the projected Premium Tank-5 (PT-5). The PT-5 is the result of a combination of the available open-source information and the analysis of the author.

The PT-5, at figure 9 and 10, will be the first tank of unconventional design to appear since World War Two. After the M48/LEOPARD 1 and M1/LEOPARD 2 generations, the appearance of the PT-5 will mark the start of the third

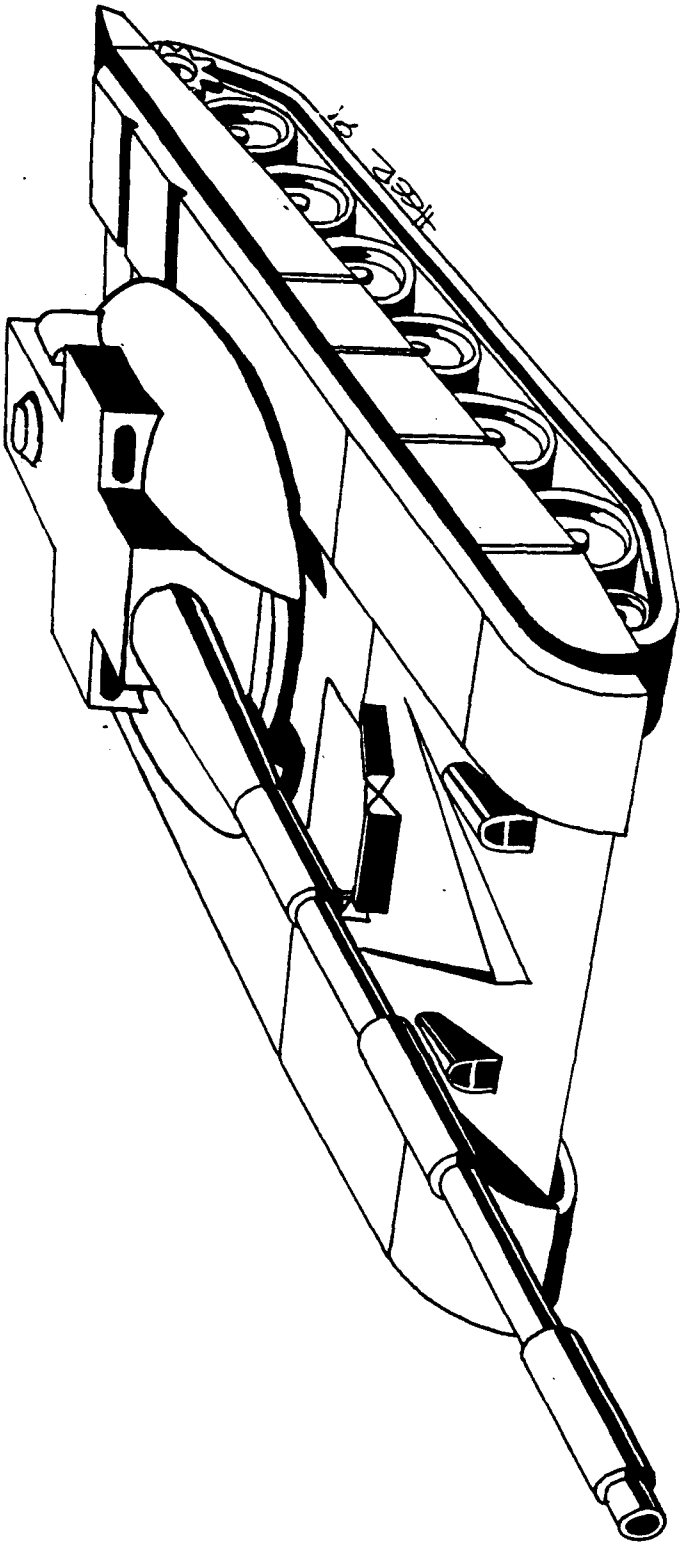

Figure 9-The PT-5
Artist: LTC Fred R. Heer, Swiss Army

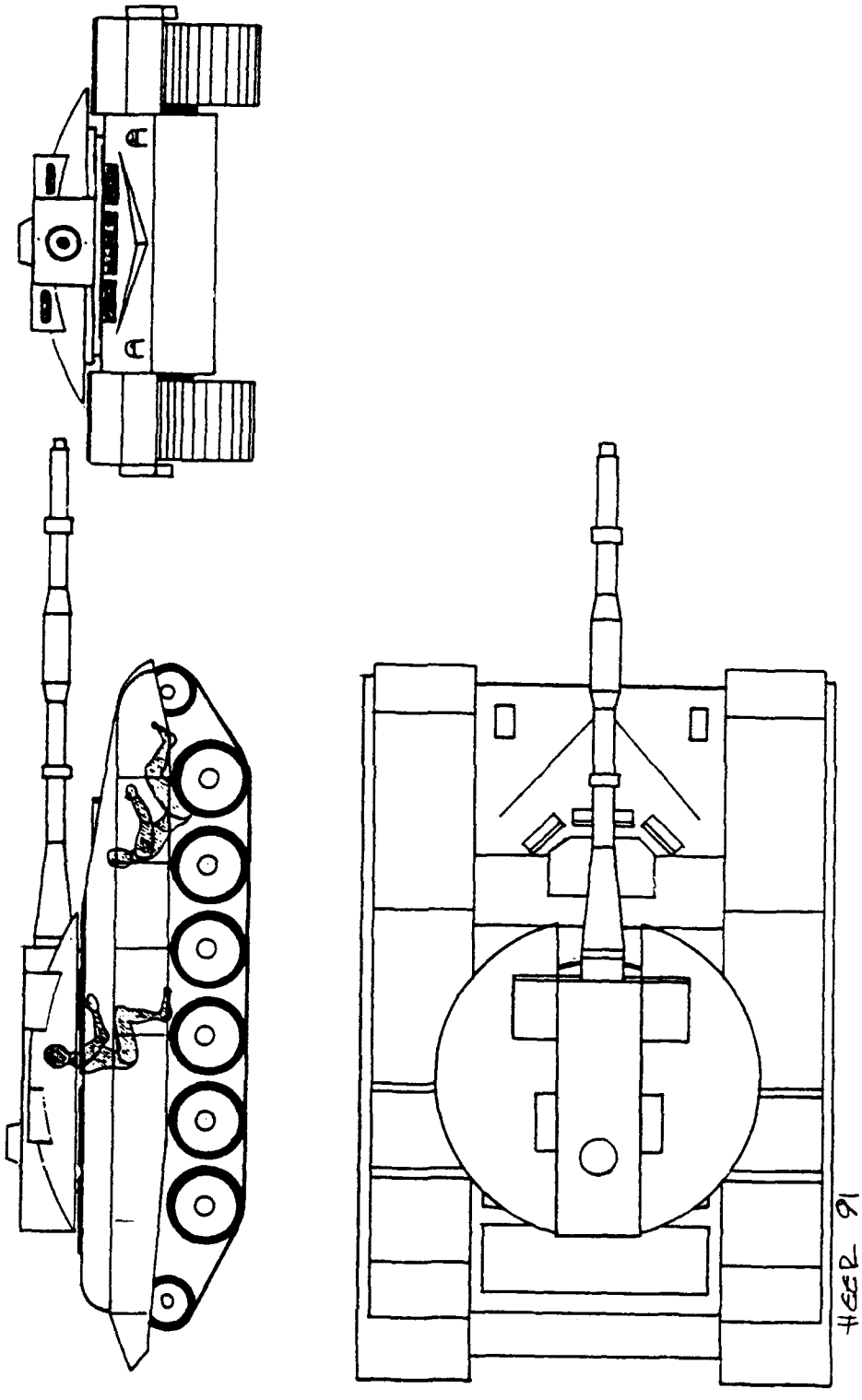

Figure 10-The PT-5 three-view
Artist: LTC Fred R. Heer, Swiss Army

post-war generation of tank development. The PT-5 will go into limited production in 1993, with the push to full scale production between 1994 and 1996. Due to its cost, complexity, and revolutionary design, the numbers of PT-5s eventually produced will be somewhat lower than past premium tanks. The PT-5 will reach its Initial Operational Capability (IOC) during the same time frame it reaches large scale production.

IMPROVED FIREPOWER

The PT-5 will mount either the new third generation 125mm main gun or the new "Rapira-4" 135mm main gun. The third generation 125mm gun will have a maximum effective range of 2500 meters, and will fire a new family of HVAPFSDS, HEAT-FS, and FRAG-HE ammunition. For any engagements beyond 2500 meters, the PT-5 will be able to fire an improved laser beam riding ATGM through the gun tube. A key characteristic of this gun will be an improved barrel-life over that of currently fielded 125mm tank guns. The PT-5 may also mount the new Rapira-4 135mm main gun, which will increase the maximum effective engagement range of the PT-5 to approximately 3200 meters. The Rapira-4 will not only fire a completely new family of ammunition including a new Depleted Uranium (DU) HVAPFSDS round, it will also fire a more powerful laser beam riding ATGM out to a maximum effective range of 5,000 meters. The secondary

armament will consist of a coaxial 7.62mm PKT machinegun and a 12.7mm NSVT antiaircraft machinegun. Both machineguns will be capable of being fired while the PT-5 is fully buttoned-up.

While the main gun carried by the PT-5 represents a huge increase in capability, the heart of the tank's improved firepower will be the new "hunter-killer" fire control system. Incorporating the most advanced capabilities available, the hunter-killer system will include a laser rangefinder (LRF), a thermal night fighting capability for both the tank commander and gunner, and an advanced shoot-on-the-move capability. Like the very similar systems used on the M1A1 and Leopard 2 MBTs, the PT-5's hunter-killer fire control system will allow the tank to accurately engage multiple long range targets, while stationary or on the move. One important advantage of the PT-5's hunter-killer system will be the employment of both active and passive defensive countermeasures.

ACTIVE AND PASSIVE COUNTERMEASURES

The active countermeasure system will be based on the Soviet Drozd (Thrush) system. The Drozd system, which was first seen on the T-55AD MBT in the late 1980s or early 1990s, consists of a radar sensor that detects incoming ATGMs, and then fires a volly of pellets from modified

turret-mounted grenade launchers to destroy an attacking missile before it hits the targeted tank.[1] The passive countermeasure system will consist of two different elements; a Laser Warning Receiver (LWR) network and the "Shadow" infrared "projector." The LWR network consists of three sensors, one mounted on the turret roof and one mounted on the left and right side of the hull. The purpose of the sensor network is to warn the PT-5's three man crew that they are being illuminated by a laser rangefinder or laser designator; and to identify the direction of the threat. Once given that information, the crew can conduct the necessary evasive maneuvers to avoid the incoming antitank projectile or missile.

The truly innovative Shadow infrared projector is designed to project a duplicate infrared and radar image of the PT-5 ten meters to the right of the projecting tank. The intent of the Shadow is to confuse Precision Guided Munitions (PGMs) or smart-bombs into locking on to and attacking the projected image and not the actual PT-5. As discussed by the Soviets in the late 1980s, and confirmed by Operation Desert Storm, combat in the future will include the large scale employment of PGMs. The PT-5 will be the first tank in the world fully capable of operating in the intense PGM environment expected to characterize battlefields of the future.

MOBILITY OF THE PT-5

The mobility characteristics of the PT-5 will also be given a high priority. Unlike its predecessors, the PT-5 will not have the initial mechanical problems historically associated with premium tanks. The PT-5 will be powered by the new Smerch (Tornado) diesel engine, providing between 1200 and 1500 hp. This new engine will combine the power and reliability of European tank engines, with the innovation and lightweight normally associated with premium tank designs. The PT-5's engine and fully automatic transmission will give the tank a maximum speed of 85 kph, and a range of operation of approximately 700 kilometers. This very impressive performance is possible because the low-profile/low-volume turret and lightweight engine allow the PT-5's combat weight to be only 50 tons. In addition to the new engine and transmission, the PT-5 will also incorporate a hydro-pneumatic suspension system. This type of suspension will allow the height of the PT-5 to be raised or lowered by adjusting the tank's ground clearance to best suit the available terrain. Although already in use by the Japanese Type 74 MBT and fully tested in the American T-95 premium tank project, the PT-5 will be the first fielded premium tank to use this type of suspension.

THE INNOVATIVE PROTECTION OF THE PT-5

Like the firepower and mobility design areas discussed above, the protection provided to the PT-5 will be very impressive and represent a huge increase in capability. The turret used on the PT-5 will be entirely new, and truly revolutionary. The PT-5's unconventional turret will be of a low-profile/low-volume design; that will not only reduce the tank's weight, but will also give the PT-5 a very low overall profile. The tank commander will be seated on the right, and the gunner seated on the left, both low inside the turret. When occupying a hull-down fighting position, the target presented by the exposed turret will be almost impossible to detect. If the turret was hit, however, the armor would certainly provide the level of protection necessary to defeat currently fielded antitank weapons.

The PT-5 will be fitted with two different types of armor protection, advanced composite armor on the turret and new "active" armor on the tank's front slope. The turret armor of the PT-5, like earlier premium tanks, will consist of a combination of both ceramic material and cast steel. In the PT-5's turret, however, the ceramic material will not be limited to the turret front. Since the PT-5's turret is much smaller than that fitted to other tanks, there is no restriction to limit the use of composite armor to save

weight. Therefore, the composite armor fitted to the PT-5 will protect all sides of the turret through 360 degrees. Instead of the filled internal cavities incorporated into the turret fronts of other premiums, the PT-5 will employ an innovative "ceramic shell" placed between the outer and inner layers of cast steel armor. This ceramic shell will ensure complete coverage of the turret from all angles of attack. While the exact ceramic material used in this composite is not known, it will certainly be more advanced than that employed by the T-64 and T-80 premium tanks.

The most revolutionary aspect of the PT-5's armor protection is the active armor fitted to the tank's glacis. Open sources have claimed that the Soviet Tank originally known as the FST-2 (class of tank technology) included "proactive armor," that would intercept an attacking projectile before it actually hit the armor.[2] According to retired General Donn Starry, the FST-2 could also have incorporated electromagnetic armor. The intent of electromagnetic armor is to destroy an attacking projectile with an extremely powerful electric charge. When a round hits the tank armor it completes an electric circuit and basically destroys itself.[3] While these possibilities still may appear in the future, they are not part of the active armor fitted to the PT-5.

Known as "snap-lock armor", the revolutionary laminate consists of a six-layer array incorporating two outer layers of steel, two middle layers or plates of advanced ceramic "active" armor, and two inner layers of steel. The two active plates are mounted on top and bottom guides, in a concept very similar to that used with household sliding glass doors. When in motion, the top and bottom guides ensure that the plates travel and return in the correct manner. The intent of the new armor is to defeat the long dart-like DU penetrators used by APFSDS ammunition. When the front slope of the PT-5 is hit, the penetrator is slowed by the two outer layers of steel. As it reaches the two middle active plates of the snap-lock armor, the plates slide to the left and right simultaneously; and then slide back to their original positions. Both of these actions occur in the smallest fraction of a second, with both active plates moving in unison. The result of this snap-lock action is the penetrator being neatly cut into three separate pieces. The kinetic energy of the severed penetrator would be drastically reduced, leaving the remaining energy and undirected parts of the penetrator to move laterally and be absorbed within the laminate. The two inner layers of steel would provide more than enough protection to protect the PT-5's crew from the remnants of the DU penetrator. The advanced composite and snap-lock laminate armor carried by the PT-5 could potentially provide complete protection

against conventional antitank weapons. The appearance of the PT-5 could be a primary force behind the decision to fully develop and field the next generation of battlefield weapons.

THE PT-5 SCENARIO

As previously mentioned, the identification of the PT-5 could occur in a wide variety of different scenarios. Any problems associated with identifying this new threat, however, will be magnified if the potential adversary follows the Soviet premium tank example. The defense related press, as well as a variety of open sources, could help keep any new tank developments secret by denying that any other country has the capability to develop high technology weapons. Several sources will argue that a given country is simply not capable of producing a tank with the very sophisticated characteristics of the PT-5. It should be remembered, however, that these same sources once believed the combination of a large caliber main gun, an innovative engine, and the use of composite armor was too sophisticated for the U.S. Army to field at virtually the same time the Soviets fielded the T-64. Since the Soviets have historically been a able to develop and field high technology premium tanks, there is no reason to assume that other nations are incapable of the same achievement. According to Soviet Military Power 1989, Soviet tank

technology was not only equivalent to that of the U.S., the relative technology level was in fact changing significantly in favor of the Soviet Union. "We discovered that things we had predicted they would have ten years from now, they already had."[4] It would clearly be an example of assuming away enemy capabilities if the U.S. Army allows itself to be caught off-guard by the deployment of the PT-5.

Apparently the potential impact of a future premium tank like the PT-5 may have already been identified. Open sources reported in 1988 that the U.S. Army had developed a new innovative type of armor using depleted uranium. While the program to field as many of the American M1A1 "heavy metal" tanks to the deployed forces prior to the start of Operation Desert Storm confirms the capabilities of Soviet MBTs, it only tells part of the depleted uranium story. Apparently the program to put DU armor on the M1A1 began in 1983, and was upgraded to a "program of national priority" in 1985.[5] Perhaps the U.S. Army identified the threat presented by the PT-5 and its 135mm main gun prior to August 1990. If the Soviet experience with the T-64 is used as an example by the developers of the PT-5, the lack of information concerning the PT-5 can be understood. When the T-64 was first deployed to the Western Group of Forces (WGF) in East Germany it was already 11 years old. Like the T-64, the first public appearance of the PT-5 may only confirm the

threat it imposed on the U.S. Army long before its projected IOC of 1994-1996.

THE THIRD CRISIS IN TANK AND ANTITANK WARFARE

When the PT-5 is finally identified, it may not in fact be as innovative and powerful as the description used in this study projects. The superiority of the American M1A1 MBT was confirmed during Operation Desert Storm. The M1A1's advanced capabilities should be able to successfully defeat any new tank that may appear in the motorpark of a potential adversary. While the PT-5 may eventually be produced in larger numbers than the American MBT, the technical superiority of the M1A1 will probably be able to override the numerical advantage of any future opponent. In the near future, the desire to sell the M1A1 to U.S. allies may provide a valuable opportunity for potential adversaries to observe the American MBT during a demonstration. Given the increasing capabilities of weapons producing countries, and the increasing distribution of new and sophisticated military technology, it is very possible that certain military delegations may view the M1A1 and not be impressed. In fact, they might not even believe that the M1A1 is the best the U.S. Army has to offer.

As with the case of the German Army in the spring of 1941, the logical conclusion to the above scenario would be

that a given country could already secretly possess a tank superior to the M1A1. Such an eleventh-hour realization would press the U.S. Army into the same unacceptable position of having to react to a technically superior enemy tank. The impact inflicted on the German Army of World War Two by the T-34 was massive, and caused the first crisis in tank and antitank warfare. The armies of NATO were put into an even more critical position by the forward deployment of the T-64 in 1976. The impact of the T-64, which caused the second crisis in tank and antitank warfare, is still an influence today. If the U.S. Army of the 1990s and beyond continues the same pattern maintained by the opponents of past premium tanks, a third crisis in tank and antitank warfare may give an opponent a critical advantage. The threat of a potential adversary applying the process of the Soviet experience to produce a future premium tank in the shape of the PT-5, must be identified and effectively countered prior to the deployment of U.S. forces to the battlefields of the future.

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CHAPTER FIVE

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